COAL AGE

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DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL MINING INDUSTRY

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Individual Responsibility

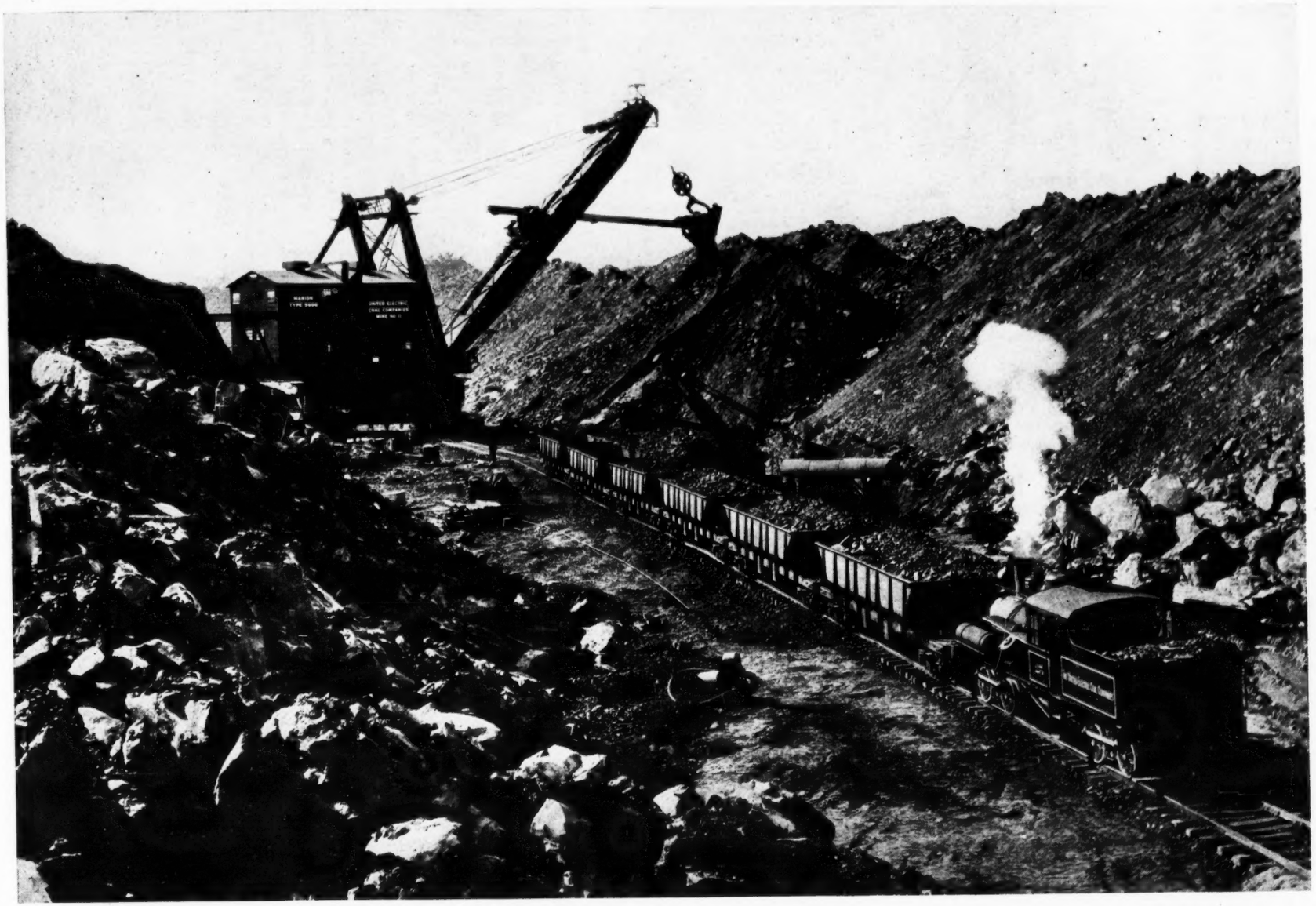
THE CAMPAIGN to repair the damage done by the recent Wall Street panic is entering its most critical stage. Associated attack upon the problem, set in motion by President Hoover, reached a climax at the Washington conference of December 5 under the auspices of the Chamber of Commerce of the United States. Responsibility for the further success of the movement now rests upon the individual business man.

SPOKESMEN for various groups have voiced their confidence in the fundamental soundness of our industrial structure. In some cases they have buttressed their position with statements of millions and billions of dollars to be expended by their divisions of American business in the coming year. These pledges strike pleasantly upon the ears of a public shocked out of its golden dreams by the shrinkage in ticker-quotation wealth.

EXPRESSIONS of confident faith and a determination to go forward, however, are not enough. "The time has come," as Dr. Julius Klein, Assistant Secretary of Commerce, told the Washington conference, "when the only sound which really counts is the clang of shovels and of cash registers." Unless these sounds are heard, doubt and pessimism will again take command of the situation.

PROMISE must be succeeded by performance. Only the individual can function here. Associations may act as clearing houses, as co-ordinating agencies; they cannot actually place the orders which will revive flagging trust in the future. Nor can any individual shift his responsibility to his fellows. It is not a case of "let George do it"; George has definitely passed out of the picture.

FINALLY, the appeal is not to the emotions, but to sober common sense. The call is not for a hysterical wave of spending, as dangerous to the future as the late storm of speculation has been to immediate security. What is needed is unafraid spending grounded on sound judgment. Business must spend money to make more money. The business man who considers expenditures with that end in view will not hold back in 1930.



When the Big Shovel Bites Into Illinois Coal

[See page 729]

With the old year drawing to a close, the question of budgeting 1930-31 operations comes to the fore. Budgeting properly done has proved an effective tool of management; carelessly done and lacking the right follow-through, it becomes a topic for jeering by the rule-of-thumb school. Mr. Bailey offers here some constructive suggestions on the mechanism of budget making in promoting better management.

Budgeting

A Tool of Management In the Efficient Employment of Capital

By Ernest L. Bailey

Wadleigh & Bailey
Consulting Mining Engineers

DURING the present period of excess productive capacity and ruthless competition in the bituminous coal industry, it is probable that the success or failure of a coal mining enterprise depends to a greater extent upon sound and efficient management than does an enterprise in any other industry. Given a mining proposition reasonably competitive in respect to natural conditions and quality of product, management becomes literally the sole factor in determining successful operation because it must control everything in the organization system and the results of operation are entirely dependent upon the extent and character of that control. No enterprise is perhaps less fitted than coal mining to run itself.

One of the most important functions of management is the efficient employment of capital in the conduct of the enterprise. Practically all well-managed coal companies have now adopted the practice of making a forecast of financial operations each year, revisions being made monthly to meet current conditions and thus present a picture of the balance sheet twelve months hence. If the forecast has been painstakingly compiled, with due consideration given to each known item and probable development, the picture, barring unforeseen occurrences, should be reasonably accurate.

Too often, however, the financial budget includes only a forecast of production and sales and perhaps takes into consideration the major items of capital expense for which moneys have been appropriated, neglecting entirely the numerous items for betterments and improvements which inevitably arise and must be currently taken care of, with disastrous results to the financial forecast. As a consequence, the forecast suffers a loss of prestige and becomes little more than a history of past hopes rather than a living, virile, dependable chart of operating results as it was originally intended to be and should properly be maintained. If a budget does not forecast results with reasonable accuracy it is better not to compile it at all, as the presentation of erroneous figures is likely to lead to false steps or unwise commitments.

There are few items for betterments or improvements which a carefully conducted survey by a competent department head will not reveal far in advance of their actual requirement. It is therefore good policy at the beginning of each year for the general manager or head operating official of the company to have each department head (superintendents, store managers, chief engineer, auditor, master mechanic, etc.) make a careful study of his particular department and list each item for which capital or extraordinary operation expenditures will be required during the year. These lists should show a brief description of each item, what purpose it will serve, what results may be expected from the expenditure, in what month or months it will be required, and a careful estimate of the cost. The items thus listed should be divided into three classes, as follows:

1. CAPITAL EXPENDITURES
The items to be included under this heading will depend upon the policy and accounting system of the company as to what items are capitalized and what charged to operation expense. Ordinarily, it will include all expenditures for new development, equipment and construction, and in most cases any addition to or renewal of existing

property or the transfer of property from one mine to another.

2. MAJOR REPAIRS
Under this heading should be listed all repairs to buildings and equipment the expense of which, if charged in any one month, would abnormally inflate the cost of production.

3. EXTRAORDINARY OPERATION EXPENDITURES
Under this heading should be listed all extraordinary operation expenditures not properly chargeable to repairs, which can be foreseen, and the expense of which, if charged in any one month, would unduly influence production costs. Among other items it would include the cleaning up of old workings, grading of haulageways, replacement of light steel rail with heavier sections, installation of feeder cables and large pipe lines or any item which would materially increase the cost of production over that resulting from normal operation.

When the above lists have been received by the operating head of the company, he usually will find that it will facilitate analysis if, in conference with the originating department head, he will regroup each class of items in accordance with the following arrangement:

1. *Items Necessary for Maintenance of Present Production*—Under this heading will be placed those items on the provision of which the maintenance of present production is dependent. It will include necessary replacements of worn-out buildings and equipment, necessary repairs to same, and such new development, track and power-line extensions, drainage, ventilating equipment and any other items the installation of which is absolutely essential to prevent a present or comparatively near future drop in production.

2. *Items Necessary for Contemplated Increase in Production*—Under this heading will be placed those items required for the realization of a definitely contemplated increase in the production schedule, from which a lower cost may or may not result.

3. *Items Which Will Effect a Money Saving*—This heading will include those items which are certain to yield a definite, traceable return, either in a lower cost of production or an increased sales realization. It will embrace the replacement of obsolete structures or equipment which will result in a positive saving in labor power or repair costs in sufficient amount to justify the expenditure after the retirement of the undepreciated value of the obsolete item and proper allowance for depreciation, taxes and insurance on the new installation. It will embrace those items of mechanization which have passed beyond the experimental stage and from which definite cost and production results may be confidently expected under given conditions. Other items that will be included are the beneficiation of the product from which an increased sales realization will be certain to result, such as screening or cleaning equipment, dustless treating equipment or a blasting agent producing more lump.

4. *Items Desirable but Not Absolutely Necessary*—This heading will include those items considered desirable and well worth the expense involved but from which definite and traceable profits are not expected. Under it may be listed improved roads, fences and sidewalks, landscaping and beautification of plants and camps, employees' recreation buildings and, where not required by law, employees' bathhouses, etc. Other items under this head will include expenditures for mechanization which are in the experimental stage or the profitable adaptation of which to existing mine conditions has not been fully demonstrated.

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ERNEST L. BAILEY

Born in the Pocahontas coal field of West Virginia, Mr. Bailey has spent his entire active life in and around coal mines. He received his engineering education at Virginia Polytechnic Institute and after graduation became mining engineer for the United Pocahontas Coal Co., Crumpler, W. Va. In 1916, he became superintendent of the mines of the old Solvay Collieries Co., now a subsidiary of the Allied Chemical & Dye Corporation. After rising to the position of general superintendent of the mining interests of the Allied company (the Edgewater Coal Co. and the Kingston Pocahontas Coal Co.), Mr. Bailey resigned in September, 1929, for the purpose of opening a consulting mining engineers' office in Washington, D. C., specializing in coal mine management and production problems as a member of the firm of Wadleigh & Bailey.

When the list has been completed, in accordance with the arrangement suggested above, it should be subjected to thorough study and investigation by the operating head, each item receiving his careful scrutiny in order that he may intelligently decide as to whether it should be retained or discarded. His intimate knowledge of the plans, policies, financial condition, sales prospects and probabilities of future profitable operation will enable him to accord each class of items the weight which it should properly have in the completed schedule. He may, for example, find it necessary to eliminate entirely Class 4, "Items desirable but not necessary," and confine his attention to the other three classes only.

He will, as a matter of course, first concern himself with Class 1, "Essential Items." If his department heads are competent and have been conscientious in the compilation of their lists, no item in the essential class should be arbitrarily eliminated but should be carefully considered. If any Class 1 items be eliminated, however, the originating department head should be so advised, with an explanation as to why the particular item is not thought necessary. If this is not done he may feel that his sincere efforts in behalf of the company's best interests are not appreciated and show a loss of enthusiasm which will in the long run be reflected in the results of his department.

On the other hand, the operating executive must bear in mind the tendency of department heads generally to ask for everything for which a conceivable need exists, prompted by a pardonable desire to bring their operation to a high point of perfection, frequently without an adequate conception of the effect of the expenditure on future costs or the company's balance sheet.

When the lists have been thoroughly gone over by the responsible operating executive of the company certain items will have been eliminated and the remaining items tentatively approved. The lists should then be turned over to the chief engineer, who, in collaboration with the originating department head, will check each item in regard to the following: (a) estimated cost; (b) necessary date for starting work; (c) time required to complete; (d) al-

(Turn to page 748)

Company Owned Houses at Grant Town; at Right Is the Top Works of Federal No. 1 Mine

Foremanship Training

PROVES GOOD FOUNDATION

For SAFETY

EVERY accident is chargeable to a company official—that is the keynote of accident prevention activities at mines of the New England Fuel & Transportation Co., located at Grant Town and Everettville, in the Fairmont field of northern West Virginia. And experience at these mines has shown that safety and efficiency go hand in hand. Better foremanship is recognized as the foundation for both, consequently the foremen are afforded opportunity by class work and club meetings to broaden their knowledge and work toward a clearer realization of their part in producing cheaper coal with fewer accidents.

Federal No. 1, the mine at Grant Town, is averaging 6,100 tons per day, and Federal No. 3 at Everettville, 2,500 tons per day. Both are in the Pittsburgh seam and the top is the characteristic drawslate. In No. 1 the track grades do not exceed 3 per cent, but in No. 3 they reach 4 per cent. Pillars are taken in both mines; some sections of No. 1 are robbed on advance, and others on retreat, but No. 3 is on full retreat. About 10 in. of top coal is left in all places to hold the drawslate. No. 1 mine is a shaft operation and liberates approximately 1,250,000 cu.ft. of methane in 24 hours. No. 2 is a drift, and its gas liberation is about 350,000 cu.ft. in 24 hours.

The first foremanship class was started Oct. 1, 1928. The year's work, extending up to May 23, 1929, consisted of two one-hour night meetings per week under the tutorage of J. H. Haskell, of the Mining Extension Department of the University of West Virginia. All of the foremen from the two mines took the course, and twenty finished with an attendance record of 80 per cent, necessary absences excepted, which entitled them to a refund of a $5 deposit made upon enrollment. The conference method of instruction was followed and the year was spent on human direction, practically to the exclusion of mining methods proper.

W. H. Forbes, safety engineer of the New England Fuel & Transportation Co., is enthusiastic over the decreased accident showing of the section foremen after a few months of the training. He cites the case of one section foreman, L. R. Cosner, who in his first 10 months of service up to Dec. 1, 1928, was charged with 22 men injured and a total time loss of 615 days, but who in December, after but two months of foremanship training made a clear record. That this improvement was not an accident is verified by the fact that on a statement of all accidents for the first 10 months of 1929 he is charged with but one man injured and a time loss of only 28 days.

This year 26 men have enrolled for an advanced course under Stanley Poundstone, also of the university extension department. Twenty of the class are those who took the 1928 course. "Causes of waste" is the first subject of study.

A unique activity is the Federal Mines Foreman's Club which was organized last May upon completion of the first year of foremanship training. Quoting from Art. 1, Sec. 1, of the constitution and by-laws;

Miners' Homes in Grant Town—Pleasant Surroundings Create a Desire to Work Safely

"Its objects shall be to encourage education in practical and scientific coal mining, to foster and promote study of improved methods of foremanship, with a view to securing the maximum of safety and efficiency in connection with our jobs, to bring closer and more friendly relations between the officials and employees and to advance the mutual interest of its membership." The initiation fee is $5, and the regular dues 50c. per month. The governing body, termed the executive board, is composed of five directors and the president, vice-president, secretary and treasurer, all of whom are elected by secret ballot from two nominations for each office made by a nominating committee appointed by the president.

The club meets once a month, alternately at Grant Town and Everettville, which are 14 miles apart by hard road. A dinner is served and the program includes one prominent speaker from out of town and usually two local men. Last summer two Sunday picnics for families and friends were held at parks within convenient driving distance.

Mine business meetings of foremen are held once, every one to three months, as deemed necessary. Before the foremanship class was started these business meetings were held bi-weekly.

Foremen compete for the best record for each quarter year based on man-hours worked and severity of injuries. This year the award each quarter is the addition of the winners name by permanent plate to a bronze tablet erected near the mine office. On this tablet there is a fifth space for the name of the foreman who exhibits the best average for the year. Each section foreman is awarded an aluminum Kohler safety lamp with his name engraved thereon when he makes his first no-accident month. At this writing every section foreman has won a lamp. No bonuses are provided because the higher officials feel that a foreman is well paid and should give his full ability to the job.

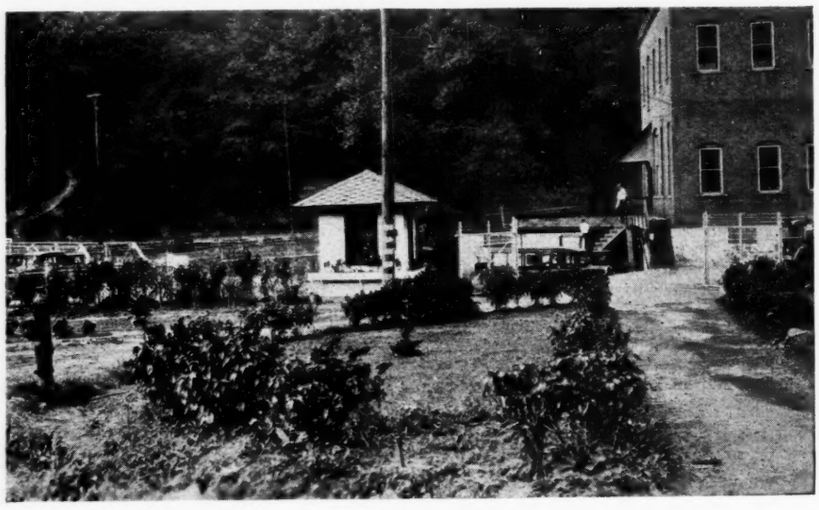
Once a year banquets are held for all employees and upon these occasions safety awards are made to the workmen. A watch fob of distinctive and fitting design is presented to each employee for his first year without a lost-time accident, and a coat lapel emblem is presented for the second year. These banquets and awards call attention to safety, and have an effect in decreasing labor turnover which is so important because 80 to 90 per cent of the injuries are to new employees who have worked two months or less.

The company also promotes an annual safety contest and picnic. Thirteen teams from No. 1 mine and six from No. 3 entered the contest last summer. Each member of the winning team received a gold watch and as further recognition had his name engraved on a "Lighthouse" trophy which was donated in 1928 by G. L. Richards, chairman of the board, Massachusetts Gas Companies, and was erected in a grass plot near the operating office at No. 1 mine. Gold watches also were given to members of the second prize team. Each member of the third team received $30 in gold.

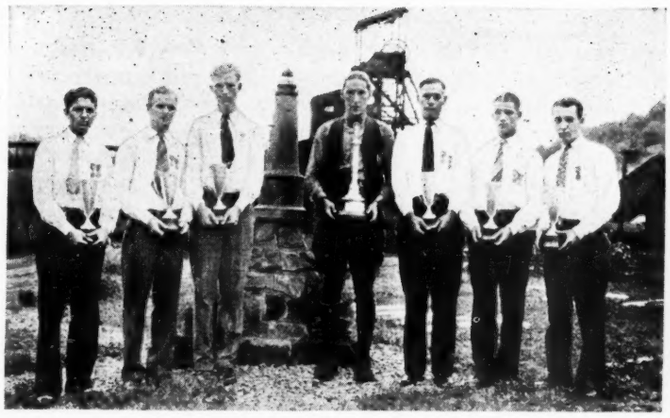
Music for safety contests, picnics and banquets is furnished by a 22-piece white band or by a 9-piece colored orchestra. These employee musical organizations play a part also in reducing labor turnover.

"Only when safety rules are treated the same as operating rules can safety progress be made," is the contention of Mr. Forbes. He believes that the big stumbling block is usually that the foremen are given to treating safety rules lightly or that they do not consider them in the same light as operating rules. Once the foreman is impressed with the idea that safety rules must be obeyed he then is confronted with the problem of seeing that his men obey. The foremen are taught that they are not respected as foremen if the workmen have outwitted them in evading an order or rule. The foreman is impressed that he exhibits himself as a poor boss or as a poor teacher if he fails to get the men to live up to the company rules.

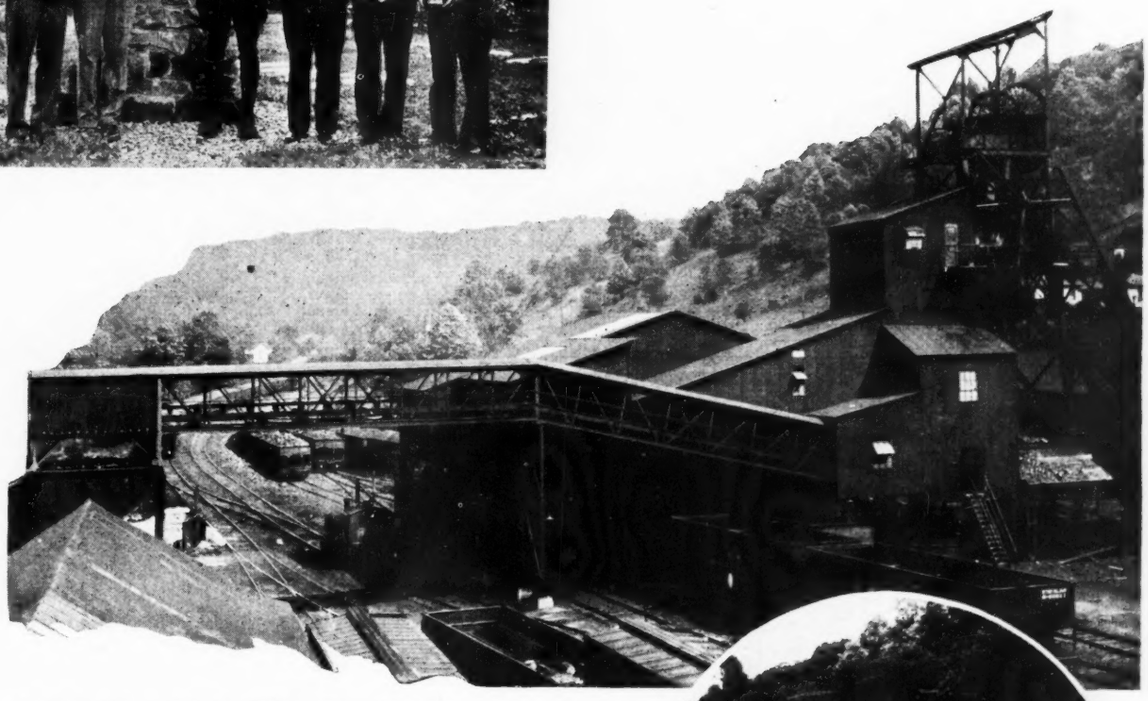
When a certain section foreman pleaded to Otto Heyer, assistant superintendent of Federal No. 1, that he, the section foreman, was not chargeable with a reported unsafe



Workers at No. 1 Traverse a Path Through a Grassy Plot Adorned With Flowering Plants and Shrubs

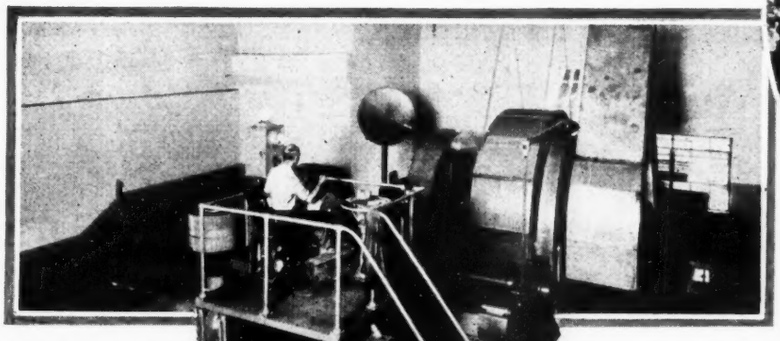


This Team Won the West Virginia State-Wide First-Aid Contest. Left to Right: Richard Quessenberry (Captain), Hugh Toothman, Everett Weinger, James Ruddy (Instructor), Jesse Haught, John Kerties (Patient) and James Maruka

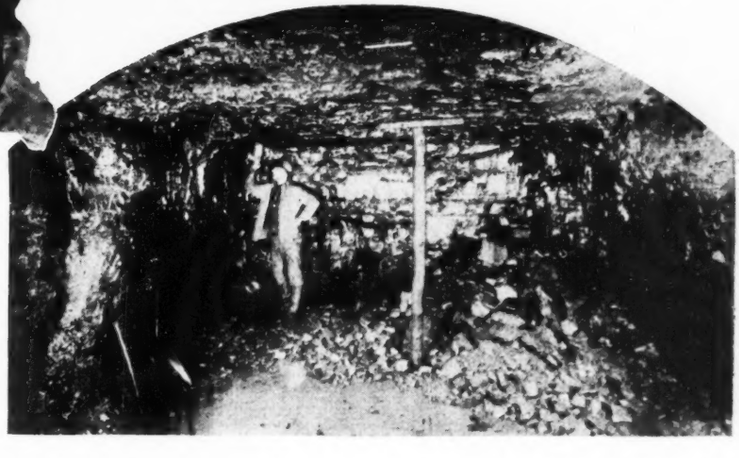


Federal No. 1 Tipple, Which Was Modernized Recently, Is Handling 6,100 Tons Per day. The Conveyor Above the Tracks Leads to the Loading Bin of a 2,200-Ft. Aerial Tram for Refuse Disposal

Valuable Prizes for First-Aid Teams, $30 to the Largest Family Present and Safety Essay Prizes Brought 100 Per Cent Attendance



Last Year the Steam Hoist Was Replaced by This 900-Hp. Electric Hoist



Both Mines Are in the Pittsburgh Seam and Top Coal Is Left to Hold the Drawslate

"The Lighthouse"

condition because he had told the miner to remedy the condition a few minutes before the safety engineer found it, Mr. Heyer replied, "The company is paying you to see that these things are done. If it was only a matter of telling the men, I could do that before they go into the mine and we wouldn't need you."

The mining machine foreman took it upon himself to establish a rule that any machine man who suffers a lost-time accident must go on the extra list. This regulation is workable because of the relatively good pay received by machine men. Being on the extra list means that a man cannot get another regular machine job until a vacancy occurs. In the meantime, however, he may work at some other company job if there is an opening.

In 1928 the machine boss was charged with 23 men injured and 1,252 days lost. During the first 10 months of 1929 he was charged with but six injuries and 219 days lost. He put the extra list rule into effect early in 1929. That, and the foremanship training have reduced mining machine accidents on the order of 75 per cent. Here it might be well to explain that accidents to machine men due to falls of roof or coal are not charged to the machine boss but instead to the section boss whose duty it is to leave the place in safe condition. Only one minor injury has occurred among machine men as a result of falls of roof or coal, lack of clearance, bad track, since this responsibility ruling was put into effect in July 1928. The section foremen see that places are made safe before "marking them up for cutting."

The foremen have been encouraged in their safety efforts by material improvements that the company has made in the physical condition of the mines. During the last two years the ventilation system of No. 1 has been entirely rebuilt. This includes the construction of many overcasts, the installation of a new fan and of an emergency power unit.

Water is used on the mining machine cutter bars and the faces are sprinkled in both mines. The piping extends to each working place and 50 ft. of hose with a nozzle is kept in each place. The machine men, however, carry their own hose for making the water connection to the cutter bar.

Estimated Cost Per Ton for Injuries During October, 1929

Federal Mine No. 1		
Frank Grake, 24 weeks @ $16..	$384.00	
Hospital and medical bill.....	340.00	$724.00
J. B. Johnson, medical bill....		32.50
J. B. Bowermaster, 8 weeks @ $16.....	$128.00	
Hospital and medical bill.....	75.00	203.00
Fletcher Crimm, 1 week @ $16.		16.00
		$975.50
Total cost for month.....		$975.50
Tons mined for month.....		124,199
Cost per ton.....		.00785
Cost per ton same month last year.....		.00472
Federal Mine No. 3		
J. A. Dillard, 9 weeks @ $16....	$144.00	
Hospital and medical bill.....	30.00	$174.00
Joseph Kegg, 12 weeks @ $16...	$192.00	
Hospital and medical bill.....	43.00	$235.00
Bill Kobaski, 2½ weeks @ $16...	$34.30	
Hospital and medical bill.....	25.00	59.30
		$468.30
Total cost for month.....		$468.30
Tons mined for month.....		58,672
Cost per ton.....		.00798
Cost per ton same month last year.....		.01673

Showing Improvement at Federal No. 1 Mine

	Tons per Major* Accident	Tons per Lost Time† Accident	Total Number of Lost-Time Accidents
First half 1928.....	17,339	7,679	70
Second half 1928....	15,451	8,715	78
First half 1929.....	27,992	13,329	42
Third quarter 1929..	38,487	34,210	9

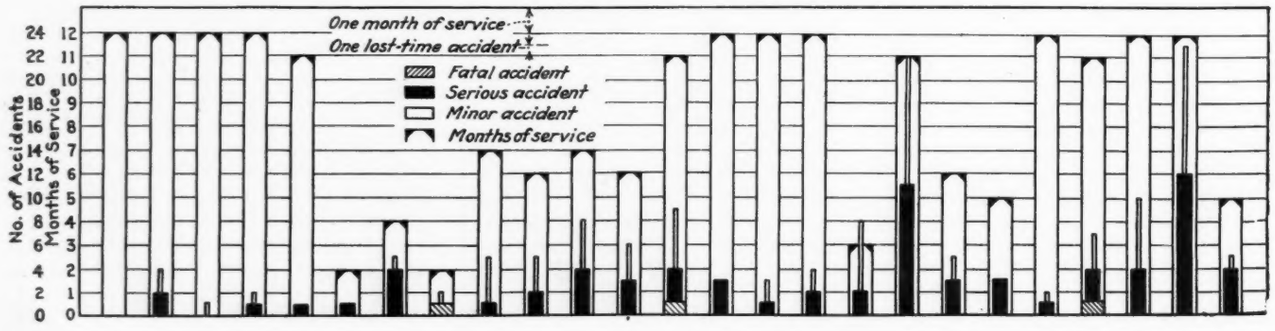
*Eight days or more lost time.
†One day or more lost time.

In No. 1 mine no places are left more than 200 ft. from the face without rock-dusting and when the rock-dusting machine gets into a place the dusting is carried clear to the face. In No. 3 mine the advancing places are kept dusted by hand to within 15 ft. of the face.

When a company goes after safety tooth and nail as has the New England Fuel & Transportation Co. and assumes the position that every accident is chargeable to some official, there is sure to be a marked improvement. With 1,001,104 man-hours of exposure during the first three-quarters of 1928, No. 1 mine, the 6,000-ton operation, has a frequency rate of 45.95 and a severity rate of 7.7. An improvement in tons per fatality from 324,562 in 1927 to 415,042 in 1928, and then to 991,938 for the 10 months of 1929, is the final testimony.

Bronze Tablet Which Will Proclaim the Winning Foremen of 1929

On a Chart 5 Ft. Long Mr. Forbes Plots the Months of Service, Fatal Accidents, Serious Accidents and Minor Accidents of Each Foreman for the Year. This Chart Shows the Record for 1928 at Federal No. 1 Mine; Each Bar Is a Foreman's Record and the Original Carries the Names of the Individual Foremen



Fifteen-Yard Shovel in Action

AMERICA'S *Largest Shovel and Biggest Strip Mine*

By R. Dawson Hall
Engineering Editor, Coal Age

DUQUOIN, Ill., has the largest coal stripping mine in the United States and the most powerful and largest of all stripping shovels, as measured not in bucket capacity but in boom length, power and constructional strength. The coal area owned and held under contract by the United Electric Coal Companies, the owners of the property, comprises 6,158 acres and constitutes a solid block of 60,000,000 tons of coal, of which at least 40,000,000 tons can be brought to the Fidelity tipple, which has just recently been constructed for the preparation of the coal mined on the tract.

The average thickness of the seam mined is 6 ft. 5 in. with a range of from 5½ to 9 ft. The average depth of the overburden is 45 ft., the heaviest cover being 60 ft. and the lightest 30 ft. Thus the ratio of overburden to coal is 7 to 1.

Though the depth of cover is by no means excessive, 45 ft. is a sufficient depth to make the use of a dragline excavator inevitable in the excavation of the "box," or first cut. Draglines must be used also in the general operation of the pit unless a shovel with a boom as long as at that on the biggest shovel at Duquoin is installed. Though the dragline excavator could not be dispensed with in opening the pit, the new shovel is so large that thereafter it can "go on its own" without the help of a dragline. This is quite an advantage, but that is not all. At this mine the thickness of the rock over the coal averages 10 ft. and is often 20 ft. The upper part of this rock is a limestone of great strength and density. Consequently the shovel must be powerful, and with that in mind it has been constructed on lines suited to a 20-cu.yd. bucket except that the struck capacity of the bucket has been held down to 15 cu.yd.

When one sees a shovel such as this one lifting, from the shaken wall of the excavation, limerock and shale, unweathered and meagerly broken, one greatly questions the preference of the engineers in the anthracite region for a small shovel; at least, one questions it wherever large quantities of material have to be excavated. Surely, there is not in the anthracite region any rock more difficult to break and to handle than the limestone in the Fidelity mine, near Duquoin.

Yet, in stripping, rock is not wholly disadvantageous. The smeary clay on the surface in the Illinois coal fields, that the rain readily causes to slide and to wash into cuts, gives a lot of trouble wherever there is no rock to build up resistance to washing and slumping. F. E. Toenniges, chief mining engineer of both the United Electric Coal Companies and the Electric Shovel Coal Corporation, says that he prefers to have rock in the pit, for with its aid the shovel builds a wall that keeps the clay away from the coal and makes possible a steeper slope, thus rendering it feasible for the shovel to dump its material nearer the point of excavation than otherwise would be desirable.

It will be noted in Fig. 1 that the large quantity of soft material, occupying 6,912 sq.ft. in the cross-section and placed by the dragline, lies back of the 1,300-sq.ft. and 1,200-sq.ft. areas placed by the big shovel, giving, with the 10-ft. berm, an assurance that the top of the coal will not be polluted with clay. A lot of sliding might go on toward the 40-ft. slope and 40-ft. berm occupied by rock and toward the 10 ft. of free berm without the clay washing down onto the coal.

The largest unit on the property is the 15-yd. shovel, a Marion 5600. One of the other big stripping companies is using a 16-yd. bucket, but the Duquoin shovel is built with the unusual boom length of 120 ft., which is 30 ft. longer than that of

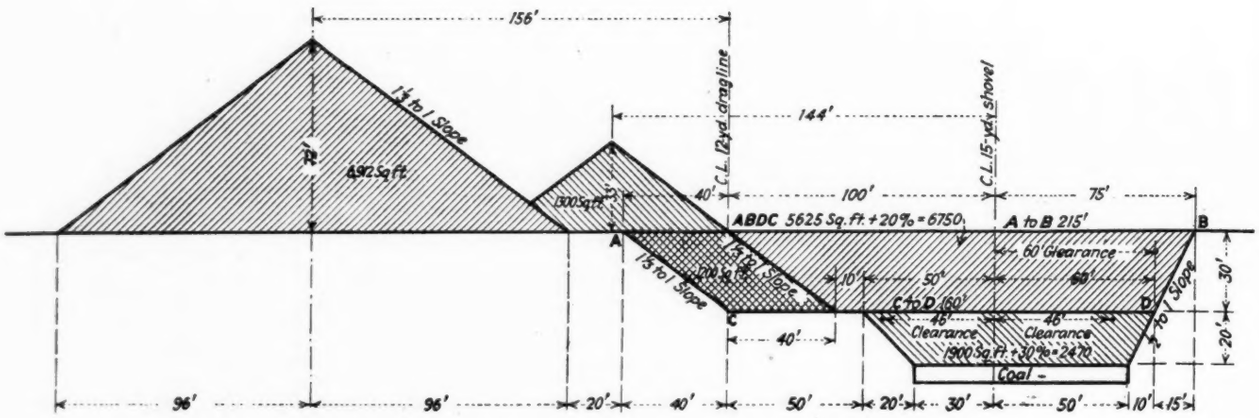


Fig. 1—Section of a 50-Ft. Box Cut Made by the 15-Yd. Shovel and 10-Yd. Dragline. Shovel Work Shaded Down from Left to Right, Dragline from Right to Left. Both Shadings Appear Where Dragline Excavation Is Replaced by Shovel Spoil.

the other shovel. The dipper stick, or handle, is 82 ft. long as against 64 ft. for a 12-yd. shovel. As a matter of fact, as usually loaded the bucket carries when heaped, 18 to 20 cu.yd. of material. This shovel forms, as stated, a unit in itself except that in making the box cut it is preceded by a 10-yd. dragline excavator. It is believed that it will fully justify its installation and be as big a step forward as the introduction of the 12-yd. shovel some years back.

The area in which it is working is not level. Just to the left of the box cut the ground is high, but a little beyond it it is relatively low. There the loose material is eroded down almost to the rock. If a 10-yd. dragline were arranged to take off the surface material it would be idle when it reached this area, which has no detrital clay, or it would have to move further along in search of working opportunity.

The dragline, Mr. Toenniges said, will not remove rock, and consequently it might be difficult to arrange matters so that both a 10-yd. dragline and a 12-yd. shovel could work in tandem without delays to one or the other. It is contended by the advocates of such co-ordinating equipment that where there is more soft material the 10-yd. dragline can take any quantity desired and leave the rest for the shovel. If there is a paucity of clay to remove at some distant point, the dragline can be made to take more clay and go more slowly with the confidence that it will progress so much faster later that it will keep its place well ahead of the procession. But despite this flexibility there is a difficulty in arranging to keep two such units traveling in tandem with varying percentages of rock and clay in the overburden.

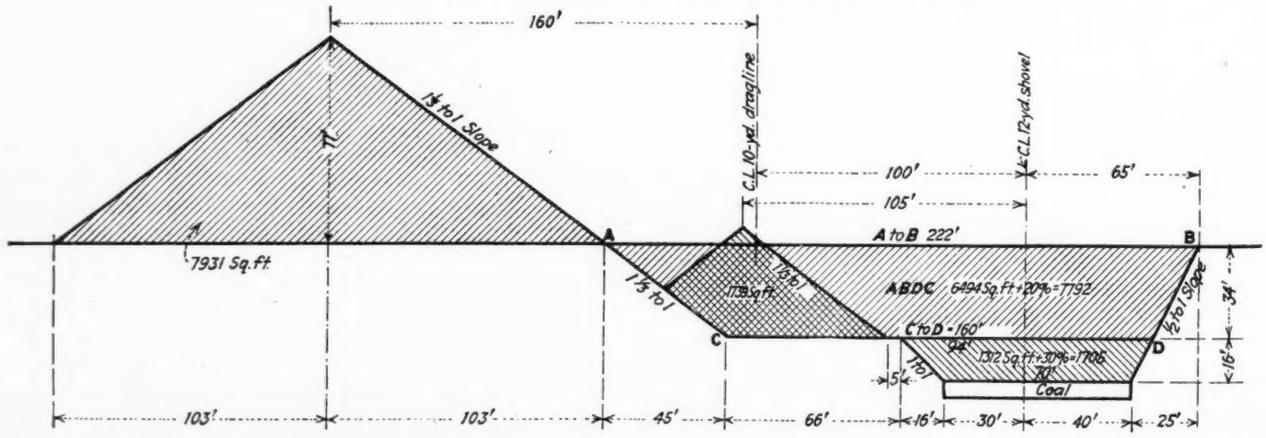
Besides the big 15-yd. shovel, two other units have been provided and are working in areas that are more level. These have each a 12-yd. shovel and a 10-yd. dragline. They will give an opportunity for comparison with the 15-yd. shovel, which itself furnishes the necessary experience for the development of future operations.

Under the conditions at Fidelity mine, it remains to be seen, of course, how much, the 15-yd. shovel is superior to the almost equally expensive combination of a 12-yd. shovel and a 10-yd. dragline. Figuring conservatively and on the basis of long-time experience and not on unrepresentative records for short periods, the big shovel should remove about 350,000 cu.yd. per month. On the other hand, the 12-yd, shovel should transfer about 250,000 cu.yd. in the same period and the 10-yd. dragline 200,000 more, or a total of 450,000 cu.yd., using about twice as many men. For short periods any and all these figures could be exceeded, but they appear to be representative of average conditions.

It would seem, therefore, that the big shovel could not do as much as the two smaller units of a little less aggregate cost, but Mr. Toenniges declares that the units working in tandem, because of an inevitable lack of co-ordination, would move only about 325,000 cu.yd. monthly.

The difficulty with the tandem arrangement is at the end of the cut, when the mammoth machines must make their return. The dragline has been leading the shovel, say to the south. It must lead it again going

Fig. 2—Section of 50-Ft. Box Cut Made by 12-Yd. Shovel and 10-Yd. Dragline.



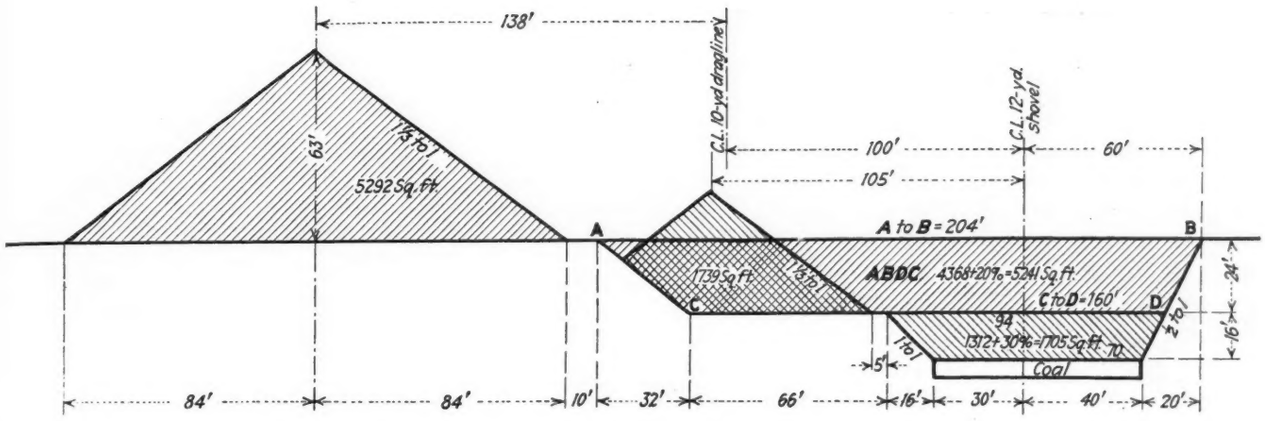


Fig. 3—Section of 40-Ft. Box Cut Made by 12-Yd. Shovel and 10-Yd. Dragline.

to the north, so the positions of the shovel and dragline must be reversed. The dragline must wait until the shovel completes its cut and the shovel must then wait until the dragline gets started.

Besides, here is a point of inflexibility. They must come to the end of the line in close sequence. Sometimes by engineering contrivance and exchange of function between shovel and dragline that can be arranged, but where the ground is irregular

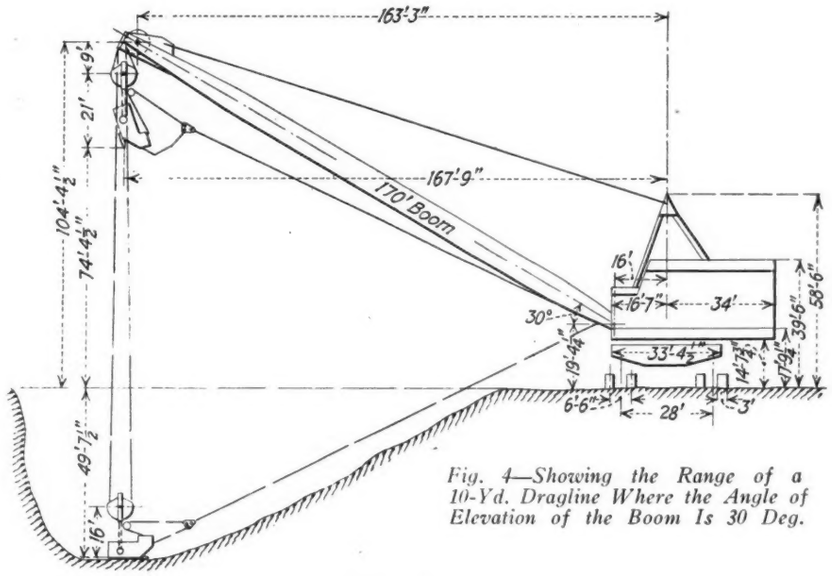


Fig. 4—Showing the Range of a 10-Yd. Dragline Where the Angle of Elevation of the Boom Is 30 Deg.

the single unit, if big enough to meet the needs, does the work with less uncertainty.

With two units—a dragline that takes the clay and places it with a 170-ft. boom well away from the excavation and a shovel that places the rock at the edge of the slope—the clay is kept from the coal more effectually than when both rock and clay are moved in each bite of the bigger shovel and both are laid down together. However, if the material is moved back so far by the single unit as to give no trouble, why fuss around with two?

In all, there will be constructed eventually some three miles of box cut on the 40,000,000-ton area. This cut is from 160 to 170 ft. wide at the bottom—wide enough for 14 or 15 railroad tracks. On the spoil side of the cut the slope is $1\frac{1}{3}$ to 1 so as to leave plenty of room for depositing rock at the foot of the slope. The inclination on the other side is much steeper—about $\frac{1}{2}$ to 1, just about what will stand up safely with a shovel gnawing at its foot. The box cut is carried down within about 20 ft. of the top of the coal. This for the 15-yd. shovel. With the 12-yd. shovel, the dragline work is carried to within 16 ft. of the coal.

The coal in the Fidelity stripping lies almost at water level and rarely outcrops to the air. At some period it was eroded to its present lines and then apparently the outcrop was covered with silt. The line of outcrop has been developed by drilling and not by the use of picks and shovels. There is no oxidized and dead coal, for the entire area is covered by at least 30 ft. of overburden and some by 60 ft., and much of the cover is rock. The box cut for the big shovel along Beaucoup Creek was cut through rock which now lies exposed where it was dropped by the bucket. Quoting from impressions and not from actual measurement, some of the pieces—even after being shot—were 10 ft. long, 5 ft. wide and 2 or 3 ft. thick. Coal under such rock is not deteriorated.

All the strippers are working along faces which are convex; that is, the material stripped is laid along curved lines of greater length and radius than those from which it was taken. The clay occupies about 20 per cent more space on being moved than it did before and the rock about 30 per cent, so the spoil bank has to be higher than the ground that has been excavated and still higher by reason of the coning or ridging effect. But the bank does not have to be as high as if the excavation were straight and still less high than it would have to be if the excavation were concave, and the filling was toward the interior of the stripped area as in the old-fashioned circular longwall, to use an underground illustration. Even with the cover thinner in the center of the area than at the extremity, unless markedly so, it pays best to work from outer lines into the area rather than to work, as in deep mining, outward.

The intention is gradually to fan out the excavations so that the shovels will eventually meet in the heart of the property. Each unit will have its area to work out and it will shuttle back and forth along its face. The fanning will be accomplished, as is usual, by shortening the lengths of the cuts in steps and

Fig. 5—Looking Over the Top of the Shovel Toward the Coal-Loading Equipment

not by modifying the width of the excavation.

All the shovels are driven electrically. The step from steam to electricity today is regarded as settled beyond question though the change must have been the occasion of much trepidation when first made.

In order to prevent breakdowns, the motors and generators of the shovel are controlled by a system which, by means of master controllers for each motion, regulates the voltage through the generator fields. Like all large shovel equipments using this system, no overload protective devices are required, as the inherent characteristics of the motors and generators make it possible to adjust the maximum power applied to predetermined values. In regular operation the operator merely moves his master controller to the "full-on" position and the equipment automatically responds to the digging requirements. All the electrical machinery used at the mine and tipple has been provided by the General Electric Co.

The big stripper is regulated so that it will lift 260,000 lb. on the bail. The bucket empty weighs 64,000 lb. and its load of 20 cu.yd. of rock, perhaps another 90,000 lb., leaving about 106,000 lb. or 53 tons, for loosening the rock or roughly 40 per cent of the entire lifting stress. The working weight of the shovel is 1,750 tons, which is about that of sixty of the ordinary shovels at work in city excavations, which weigh about 30 tons. Of the 1,750 tons, 200 is ballast.

The shovel can lift material to a height of 82 ft. 6 in. It is said that no other shovel is equipped to lift spoil over 65 ft. The maximum dumping radius is 145 ft. 10½ in. whereas a 12-yd. shovel has a maximum dumping radius of 109 ft. 10 in. Its maximum cutting height is 97 ft., so it can cut a greater height of spoil than it can arrange to dump when stripping coal in a level country. The shovel was erected, of course, on the ground, a space 100 ft. square being bared to the rock so that a solid foundation for the erection could be provided.

Only one operative, one engineer and two pit men are needed for the operation of the 15-yd. stripper. The dipper makes a trip from the face to the spoil bank in one minute, including the time to take a bite and dump the spoil. The speed of travel is 20 miles per hour. The accompanying ratings of the motors give an idea of the demands for power.

Liquid oxygen is being used now to shatter the rock, the holes being drilled down through the loose and solid material by Armstrong and Loomis drills. The company finds liquid oxygen cheaper than 40-per cent dynamite and declares that it fractures the limestone more effectively than that explosive. The latter is said to have a detonating speed of 15,650 ft. per second, whereas L.O.X. has one of 17,248. The plant was installed by the Keith Dunham Co.

Between 5 and 10 per cent of the coal is sacrificed in every strip pit in the interests of clean coal. One of the losses is that a rib of coal usually is left along the waste bank to hold back the rock and earth that is piled up by the shovel. This percentage of loss, however, includes the natural impurities in the coal, which are picked out at the tipple.

The crawlers under the big shovel carrying a bearing pressure of only 58 lb. to the square inch and being 36 in. wide with a total bearing area of 420 sq. ft. in all, the weight of the shovel does not crush the coal. The coal is broken by black powder shots after the coal has been swept by brooms and cleaned by air pressure. It is loaded with 3-yd. Marion shovels into self-dumping 44-ton American Car & Foundry Co. cars with Timken bearings, six cars forming a trip which is hauled up a grade to the tipple by 42-ton Heisler locomotives, one to each trip.

All work on these coal-loading shovels is done by one man who between trains cleans up the cut, gets into favorable position for loading the next trip and oils and adjusts his engine.

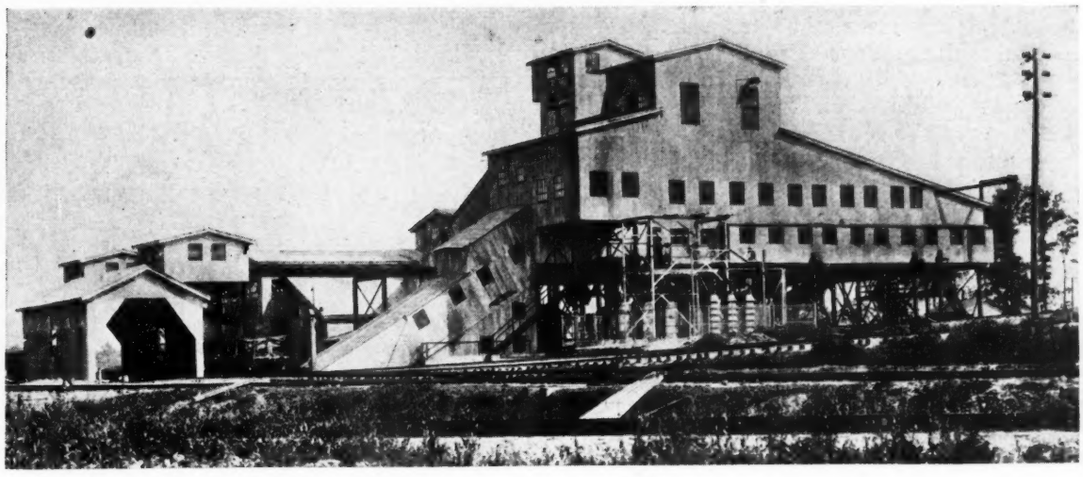
Long drainage ditches have been made across the property parallel with the box cuts and 500 to 600 ft. distant therefrom with a Marion 37 dragline having a 1½ yd. bucket. Laterals are made at right angles to this ditch at intervals of 600 ft. Any water pumped out of the cut is piped to the nearest lateral ditch. Other ditches will be made in time to function when the working faces on their advance have passed the ditches first constructed. However much rain may fall, the water will be carried away without delay. One of the big difficulties in past strippings has been the floods which invaded the pit during periods of heavy precipitation.

H. C. Swallow, president, United Electric Coal Companies, desirous of leaving the stripping as an object of beauty in the painfully flat country of southern Illinois, has arranged with the State Forestry Department to plant 10 acres of land with trees every year, thus converting the relatively sterile plain into an irregular park-like forest of romantic beauty.

Motor Power of Shovels and Draglines Used at Fidelity Stripping

	Coal Loader	General Utility	Stripping Equipment		
	3-Yd.	Dragline 3-Yd.	12-Yd. Shovel	10-Yd. Dragline	15-Yd. Shovel
Motor-driving generators	100 hp.	100 hp.	800 kva.	800 kva.	1700 kva.
Hoist generator	50 kw.	50 kw.	400 kw.	400 kw.	860 kw.
Swing generator	15 kw.	15 kw.	200 kw.	200 kw.	350 kw.
Crowd generator	14 kw.	14 kw.	150 kw.	150 kw.	350 kw.
Hoist motors	60 hp.	60 hp.	250 hp.*	250 hp.*	450 hp.*
Rotating motors	23 hp.	23 hp.	125 hp.*	125 hp.*	187½ hp.*
Crowd motors	23 hp.	.....	150 hp.*	.....	187½ hp.*
Exciter generators No. 1.	5½ kw.	5½ kw.	35 kw.	35 kw.	50 kw.
Exciter generators No. 2.	.....	.....	27 kw.	27 kw.	.....
Exciter set motor	7½ hp.	7½ hp.	75 hp.	75 hp.	.....
Total approximate	350 hp.	325 hp.	3000 hp.	2850 hp.	5600 hp.
Peak power demand	167 kw.	167 kw.	750 kw.	750 kw.	2190 kw.
15-min. power demand	67 kw.	58 kw.	224 kw.	180 kw.	562 kw.

*Two motors each of the horsepower noted.



Fidelity Tipple from Empty Tracks

BREAKER *Erected at* BITUMINOUS STRIP PIT

By H. S. Schneider
Engineer, Jeffrey Manufacturing Co.
Columbus, Ohio

BECAUSE strip-pit coal is not cleaned where it is loaded but is dumped into the pit car promiscuously like the mechanically loaded coal in a deep mine, the preparation plant at a stripping occupies an important and necessary place in the operation. Conceivably a deep mine with properly instructed and exceptionally well-meaning miners might "get by" with a mere tipple where the coal would be dumped without further cleaning. But any mine with mechanical loading must depend for clean coal on the excellence of its preparation plant.

One of the reasons why strip coal now receives such a kindly reception in the market is because today it is obtaining at the tipple the best kind of cleaning and sizing. At first, strippings were small and as the railroad car could be backed right to the loading point it was possible to load directly into it, saving both tipple and transportation, but at the expense of the product. Though a tipple was greatly needed the short life of the stripping often would not justify a large expenditure on coal-cleaning equipment.

Today, though daily outputs have increased, the size of strippings has been even more greatly augmented, so that larger, better, and more permanent tipples than those first constructed have been erected. That of the Fidelity strip mine of the United Electric Coal Companies, in Duquoin, Ill., well illustrates this fact. The coal to be cleaned is that from No. 6 seam, which is considered one of the best beds in Illinois, but every seam has its impurities. This one has a blue band of slate, a parting characteristic of the seam and one by which it is identified. To produce a high-grade fuel this slate band must be removed.

The quantity of coal that will pass through this tipple during its life will be 40,000,000 tons and perhaps even 65,000,000. About 7,000 tons of this will have to be prepared daily. With 214 working days this will be 1,500,000 tons yearly. So the tipple will operate from 26 to 43 years—a length of time justifying the building of a structure as large and complete as this.

Outstanding features in this tipple are equipment for crushing all coal passing over a 6-in. screen, if so desired; picking tables for removing pyrite from the coal thus to be crushed, so as to prevent this impurity from being broken and mixed with the fine coal; means for segregating top coal, crushing it to stoker size and loading it in railroad cars; mixing devices and equipment for crushing such sizes as may be temporarily unsalable to sizes for which there is a demand. Thus the product of the tipple can be varied almost indefinitely.

It should be noted that the tipple sets precedents in its large use of spur-gear reducers, mounted each with its motor on a single cast-iron base. Texrope drives are extensively used. Because the coal is, or can be, broken before sizing with rolls and after sizing, if desired, by three other crushers, it is doubtless permissible to describe this preparation unit as a "breaker."

The tipple, which was designed and erected by the Jeffrey Manufacturing Co., has a rated capacity of 800 tons of coal per hour and can place lump, 3 x 6-in. egg, 2 x 3-in. egg, nut, slack and top coal on separate tracks simultaneously. When desired, any mixture of these grades

can be made. The grading possibilities of this tipple are said to exceed anything hitherto attempted in tipple construction. All operations are electrified with General Electric Co. equipment.

An inclined conveyor gallery 15 ft. wide and 120 ft. long leads from the dump hopper to the preliminary crushing and picking plant, which covers approximately 7,200 sq.ft. The main part of tipple embraces about 10,000 sq.ft. Probably no tipple has a larger empty and loaded railroad car storage than is provided at this plant. All the tracks are ballasted with lime rock. Another interesting feature is the use of 44-ton automatic drop-bottom pit cars. This is probably the first mine to use equipment of this size and type.

Notwithstanding the unusually heavy loads which this tipple handles it is practically free from vibration. Each conveying unit of the tipple has a self-contained steel frame.

The main conveying units of the tipple have a total length of 1,725 ft. and require the use of 7,200 ft. of chain; the two screens in the main plant weigh about 20 tons each, yet so perfectly are they balanced that they will coast for 1½ minutes after power is shut off. About 1,000 hp. is used to drive the conveying, crushing and screening equipment.

The isometric drawing on page 736 shows the flow of coal from the pit car to the railroad car. On arriving at the tipple on standard-gage tracks, the cars are either pushed or pulled over the dump hopper and automatically dumped. Neither the cars nor the locomotive are uncoupled, thus effecting a great saving of time and labor. The latches holding the hinged bottom doors of the pit cars are opened by means of two cams located on one side just outside the rail over the dump hopper. These cams are thrown in or out depending on which end of the hopper needs to be filled.

AFTER the first car has been dumped, the locomotive advances a car length, bringing another car into position for dumping. As the first car passes over the end of the hopper, a cam, located at the center line of the track, closes the doors and latches them. After all the cars have passed the hopper, the train picks up a car of refuse and returns to the pit for more coal.

From the dump hopper, *A*, the coal is fed through a plate feeder, *B*, onto the bottom run of a large scraper conveyor, *C*. At its foot this conveyor is horizontal and has its top and bottom strands spread at 9½-ft. centers, so that the top or return run passes over the feeder skirt plates, while the bottom or carrying run passes below the feeder plate, the coal dropping from the center of the feeder into the conveyor. The horizontal and inclined portions of this unit are connected by curved sections having long radii.

Where this conveyor emerges above the ground line, a large rack and pinion side-valve, *D*, is provided which when opened admits the coal to the preliminary picking and crushing plant, should it be desirable that it go there. Otherwise, this valve is closed and the coal passes on to the head of the conveyor, where it is delivered onto the main screens, *E* and *F*, in the tipple.

IF THE coal passes through the valve *D*, it falls into a large twin hopper, from which point it is handled by two duplicate outfits to facilitate the preliminary picking. The coal is fed out of the twin hopper through two plate feeders, *W*, and over bar-screen chutes onto two apron conveyors, *X*, which at the foot end are horizontal but further on pass up an incline to a higher level where they form horizontal picking tables. Here the pyrite balls are picked out and thrown into a horizontal refuse drag conveyor, *F'*, below the floor level.

If the sole purpose of this diversion is for the reduction of pyrite, the coal is discharged over the head pockets into chutes, *Y*, and the run-of-mine coal onto the top run of a cross-scraper conveyor, *C'*, to be carried over to and discharged into the bottom run on an incline scraper conveyor, *E'*, which returns the coal to the main incline scraper conveyor, *C*, and then onto the screens, *E* and *F*, in the main tipple.

If the coal is to be crushed before passing through the tipple, large fly valves in the chutes, *Y*, at the head of the picking tables are closed, allowing the coal to pass from the tables onto two sets of shaker screens, *A* and *Z*, which take out the 6-in. coal and under. All oversize passes from the screens through two large single roll crushers, *B'*, where it is reduced to 6-in.

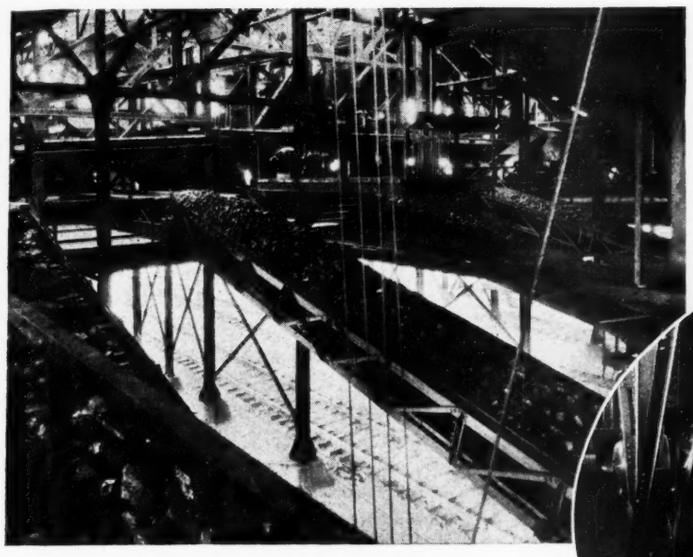
Coal which passes through the screens is bypassed around the crushers and is loaded into the bottom run of a horizontal cross-scraper conveyor from one side and that which passes through the crushers is loaded into the same conveyor at points directly opposite. This 6-in. coal is then carried to one side and discharged into the same inclined scraper conveyor, *C'*, before mentioned and thence to the main incline scraper, *C*, and into the main shaker screens, *E* and *F*, at the top of the tipple.

The coal which is discharged on these screens passes over a scalper-screen deck extending the full length of the upper screen, *E*, thus affording close grading. The 3-in. coal going through the scalper passes over the middle deck of the upper screen, where the 1¼-in. and under is removed. The 1¼ x 3-in. coal is discharged onto the nut-picking table and loading boom, *J*, by means of a back chute. The coal that is 1¼-in. and under passes over a vibrating screen, *K*, which removes the ¾-in. and under. This is discharged into the bottom run of a scraper conveyor, *L*. The ¾-in. and under is taken from a gathering hopper under the vibrating screen by a drag conveyor, *H'*.

The coal which has passed over the scalper and the 1¾ x 3-in. coal which has passed over the middle deck of the upper screen are united at the lower end of this screen and then pass onto the upper deck of the lower screen, *F*, where the coal is further sized into 2½x3-in. egg, 3x6-in. egg and 6-in. lump. The two sizes of egg pass onto the two egg picking tables and loading booms, *H* and *I*, by means of back chutes under the lower screen, *F*. The lump coal moves straight ahead to the lump-picking table and loading boom, *G*.

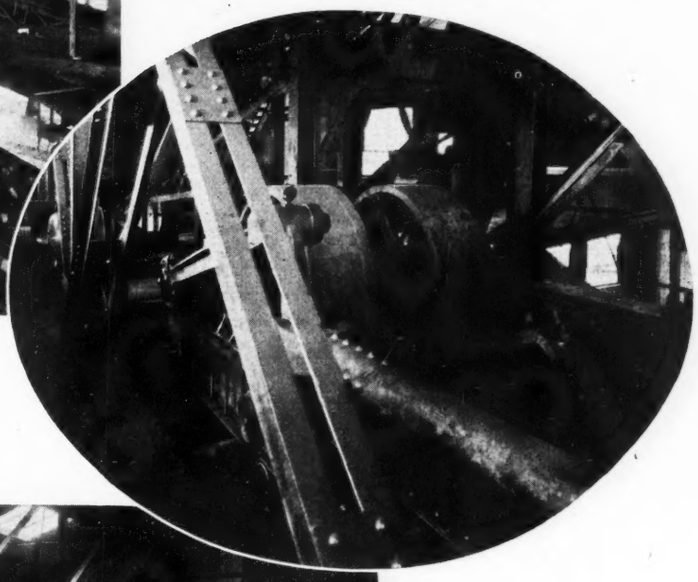
THE back chutes for the nut and the two sizes of egg, as well as the lower end of the lower shaking screen, are fitted with rescreen plates insuring products containing a minimum quantity of fines. Under each of the rescreen plates in the loading chutes is a gathering hopper which collects and loads the fines that drop through into the rescreen drag conveyor, *H'*, located directly under the screens. This conveyor carries the fine coal back so that it joins the fines (¾-in. and under) from the Hummer vibrating screen, *K*. This product is then delivered either to the bottom run of a V-bucket conveyor and elevator, *M*, which discharges either into two Hummer vibrating screens, *N*, located above a 75-ton storage bin, or through a valve into the slack conveyor, *L*.

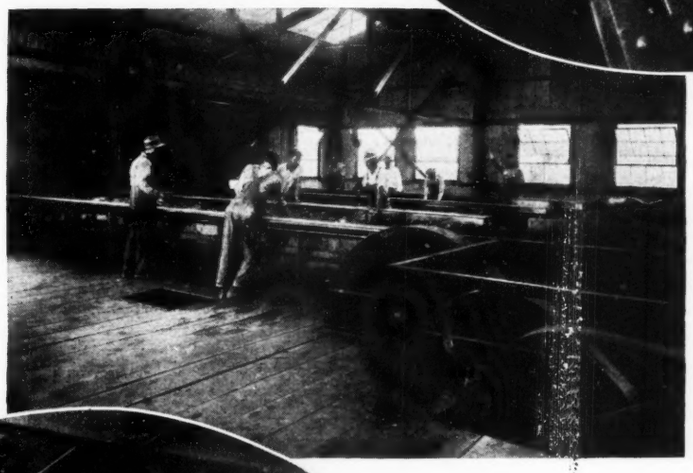
These two vibrating screens, *N*, make a further separation, the ¾ x $\frac{3}{16}$-in. going to the storage bin or being



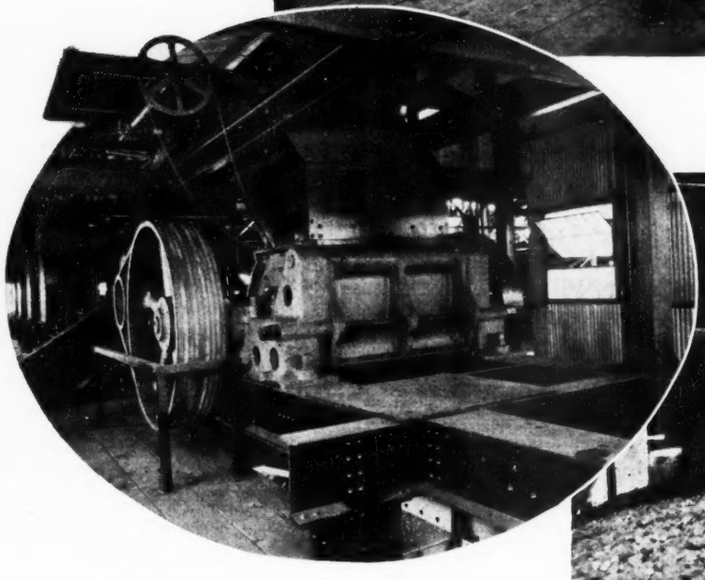
Four Loading Booms in Foreground and Central Operating Platform With Push-Button Control in Rear

Main-Screen Drive with Heavy Pipe Connecting Rods, Heavy Rocker Shaft, Crankshaft, Crank Connecting Rods and Counter-balanced crank



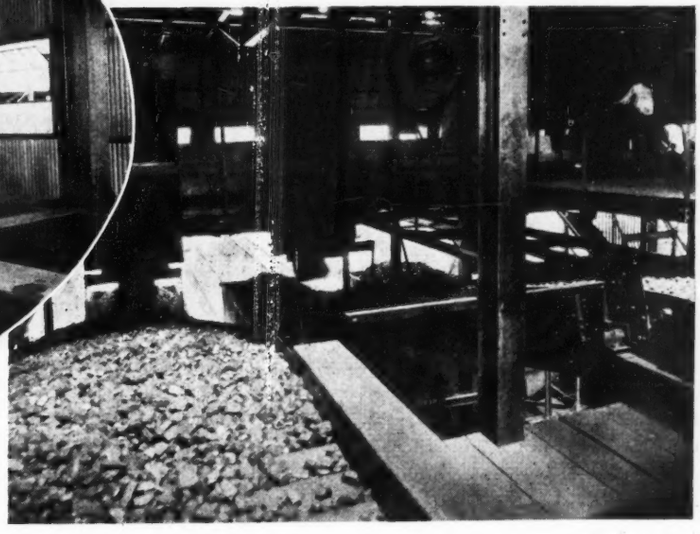


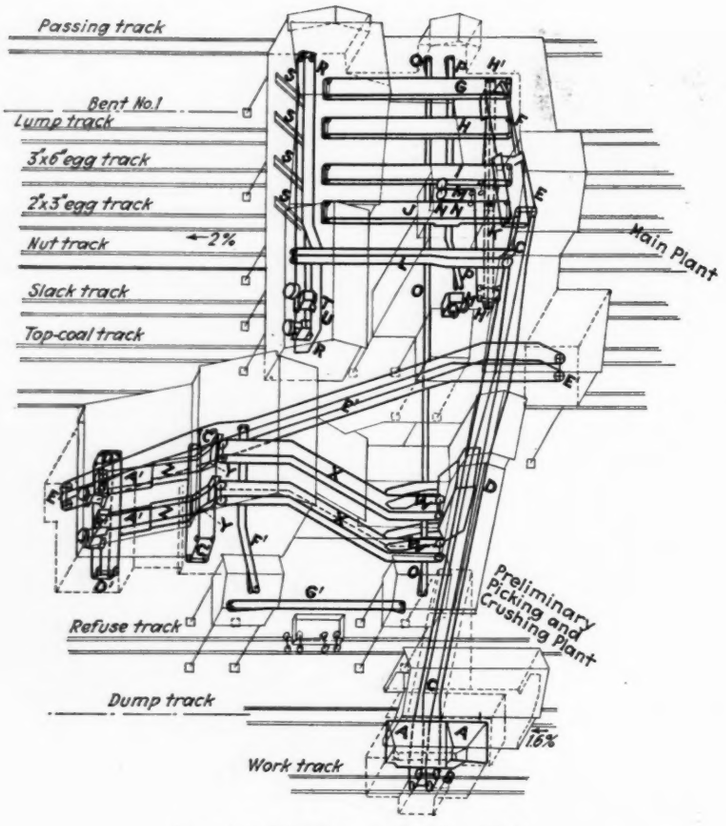
Pyrite Picking Space in Preliminary and Crushing Plant



Single Roll Crusher 36x54 in. Between Strands of Mixing Conveyor. Space for 42x48 in. Rigid Hammer Crusher Provided in Foreground

Loading Booms Showing Chutes to Mixing Conveyor; Also Receding Chutes





Isometric Elevation of Fidelity Tipple

deflected by fly valve and chutes into the aforementioned scraper conveyor, *L*, to be mixed with the $\frac{3}{4}$ x $1\frac{1}{4}$-in. from the lower vibrating screen, *K*. The $\frac{3}{16}$-in. and under, or "duff," is collected in gathering hoppers under the upper vibrating screens and is delivered through chutes either to the possible future "duff" cross drag conveyor, which will load the product by means of a bifurcated chute into railroad cars for market, or if there is no market for the product, it can be discharged either into the slack scraper conveyor, *L*, to be mixed with the $\frac{3}{4}$ x $1\frac{1}{4}$-in. slack, or into the refuse drag conveyor to be disposed of as refuse.

The coal on the lump, the two egg, and the nut-picking tables and loading booms, *G*, *H*, *I* and *J*, is picked, the top coal being removed and dropped into the top-coal drag conveyor, *P*. Whatever refuse remains in the coal also is picked out here and is deposited in the refuse drag conveyor, *D*. Both drag conveyors are located entirely under the floor, openings of sufficient size being provided to allow the top coal and the refuse to drop through.

After the top-coal drag-conveyor has passed under the four picking tables it rises on an incline, discharging into a rigid hammer crusher, *Q*, which reduces this product to coal of suitable size for feeding stokers.

The refuse drag conveyor also passes under the four picking tables and, extending horizontally beyond them, it receives the $\frac{3}{16}$-in. and under, "duff", and then passes over and through part of the preliminary picking and crushing plant to the refuse track located near the dump track.

IN order to facilitate the loading of refuse into the contractor-type side-dump cars, the refuse conveyor, *F'*, from the preliminary picking plant, which is carried out over this track, discharges into another refuse drag conveyor, *G'*, located directly over and parallel with the refuse track. Both the conveyor *G'* and the refuse conveyor, *O*, though they travel at right angles, discharge at the same point. The refuse from both conveyors passes through a common chute, consequently, the refuse cars are all spotted at a single point. These refuse cars, as previously stated, are then picked up by a locomotive and taken to the pit for disposal on its return trip.

After coal is on the loading booms, *G*, *H*, *I* and *J*, it may be loaded by lowering the booms directly into railroad cars for market, or the booms may be raised so as to discharge into either the top or the bottom run of the mixing scraper conveyor, *R*, which passes across the entire end of the tipple at the ends of the booms.

With this arrangement any desired mixture may be obtained; for example, the 3 x 6-in. boom, *H*, may be raised to discharge the coal into the top run of the mixing conveyor, *R*. The coal is thus carried across to the single roll crusher, *T*, located between the top and bottom runs of the scraper and over the $\frac{3}{4}$ x $1\frac{1}{4}$-in. nut track. The 3 x 6-in. coal is crushed to $2\frac{1}{2}$ x 3-in. egg; this product is then carried back on the bottom run of the mixing conveyor, *P*, and is discharged through a rack and pinion valve into a receding chute, *S*, to be loaded into a railroad car at the end of the $2\frac{1}{2}$ x 3-in. loading boom, *I*. Both products are well mixed as they are loaded into the car. Likewise the $\frac{3}{4}$ x $1\frac{1}{4}$-in. and the $\frac{3}{16}$ x $\frac{3}{4}$-in. from the scraper conveyor, *L*, may be loaded into the bottom run of the mixing conveyor and mixed with any one or more of the products being loaded over the loading booms, *G*, *H*, *I* and *J*.

THE receding chutes *S*, are located under the bottom run of the mixing conveyor, one at the end of each loading boom, *G*, *H*, *I* and *J*, and are operated by raising and lowering of the loading booms. The booms, however, may be operated without working the receding chutes simply by disconnecting the operating cable of the chutes from the bail at the end of the booms.

The $1\frac{1}{4}$ x $\frac{3}{4}$-in. slack may be loaded directly from the scraper conveyor, *L*, through rack and pinion valve and bifurcated chute into railroad cars for market and the $\frac{3}{16}$ x $\frac{3}{8}$-in. slack may be loaded on either of two tracks from the storage bin.

Another new feature is the equipment of the lower shaking screen, *E*, with a large twin fly valve, affording a means of splitting the entire product—that is, run-of-mine or any product down to a 3 x 6-in. egg—and loading it over both the lump and 3 x 6-in. egg booms, *G* and *H*, or loading $2\frac{1}{2}$-in. lump over the lump boom, *G*.

All the electrical equipment in the tipple was provided by the General Electric Co. All of the units in the tipple are controlled by push buttons from one of two central points, one located in the preliminary picking and crushing plant and the other in the tipple. In order to avoid flooding, certain units are interlocked, causing sequential starting and stopping of units.

Compressed Air

Stages Economic Come-Back

IN MECHANICAL MINING AT EHRENFELD

By Alphonse F. Brosky
Associate Editor, Coal Age

COMPRESSED AIR — that form of mechanical energy which played a considerable rôle in the getting out of coal in earlier days, only to be discarded because of the then notorious inefficiency in its use—has re-entered the list of major mining aids in underground mechanization. At the Ehrenfeld mine of the Pennsylvania Coal & Coke Corporation, operating near Cresson, in central Pennsylvania, a compressed-air plant has been installed on the surface and from it pneumatic power is piped more than a mile into the No. 3 opening, where it is used for driving conveyors and also for drilling.

Applied initially as an instrument of safety, its use subsequently has proved it also to be, according to S. W. Blakslee, general manager, "highly satisfactory from the standpoint of performance. While the loss in the compressor plant, in the conversion from electrical to pneumatic energy, is of no little magnitude, operating economies and safety advantages are realized that more than compensate for conversion loss. Machine failures and consequent delays are fewer and maintenance costs are lower. Transmission losses are slight and need no longer be considered a condemning factor."

At Ehrenfeld the "B," or Miller, seam is being mined. Though this coal contains only 17½ to 18½ per cent of volatile matter, dust from it is recognized as explosive. The mine is classified as gassy because gas sometimes is found after the occurrence of major roof breaks. A desire to secure a higher degree of safety than is achieved by usual methods turned attention to large-scale use of compressed air in this mine.

Changing from electricity to air was considered in 1927. At that time small electric drives for conveyors and drills had not yet received government approval and so, if the highest of safety regulations were to be complied with, these machines could not be powered by electricity. Compressed air has always been on the safe list and was therefore chosen for the purpose. The mine was not without experience in driving conveyors with air, for several units had been propelled by portable compressors for some months.

Cutting methods, of course, did not constitute a problem because electricity could be used for the purpose under government approval. Some consideration was given to the question of complete elimination of electricity within the working panels. That meant digging by hand or cutting by air-driven machines. Neither invited a trial, the operation costs, judged from evidence at hand, being excessive.

The system, room-and-pillar, developed for conveyor mining at Ehrenfeld is shown in Fig. 1. In a solid block of coal measuring 1,540 ft. long and 340 ft. wide, rooms are turned and mined retreating. Only two rooms are worked at a time; these are each 40 ft. wide and are separated by a 20-ft. pillar; they are driven up simultaneously and the pillar between them is taken before the succeeding pair of rooms is started. A rib of coal 5 to 10 ft. thick is left between pairs of rooms. Shaking conveyors and portable chain-flight conveyors are used jointly in the system.

In the Ehrenfeld mining system a 40-ft. caving chamber is driven parallel with the room headings. The purpose of this chamber is to relieve pressure resulting from stresses in the measures overlying the area being mined. This preparatory caving is the outcome of experience and observations over a period of years in this mine. For instance, places driven in coal adjoining a caved area are less frequented by roof troubles than places advanced in coal remote from caved areas. The direct results of

Fig. 1—Double-Room Layout for Conveyor Mining

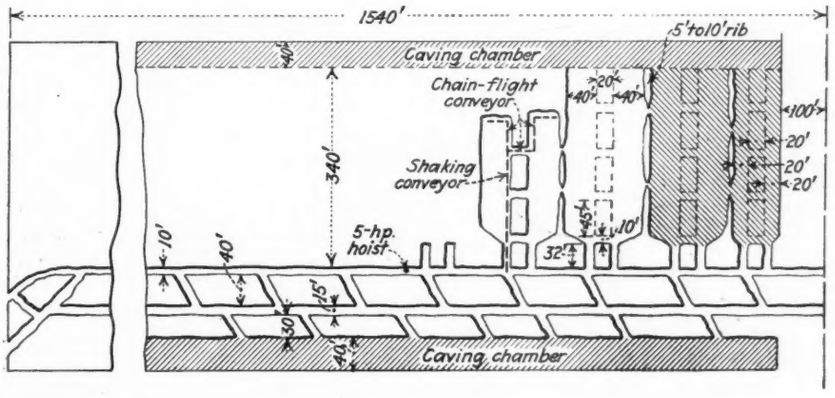


Fig. 2—Entry Roof Relieved by Caving Chamber

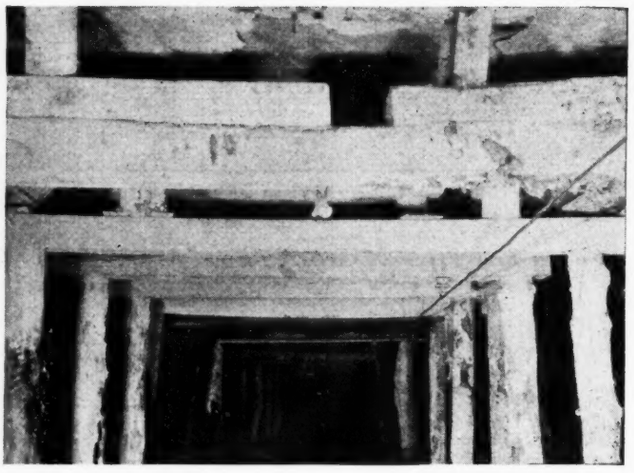


Fig. 3—Caving Chamber Eliminates This Timbering

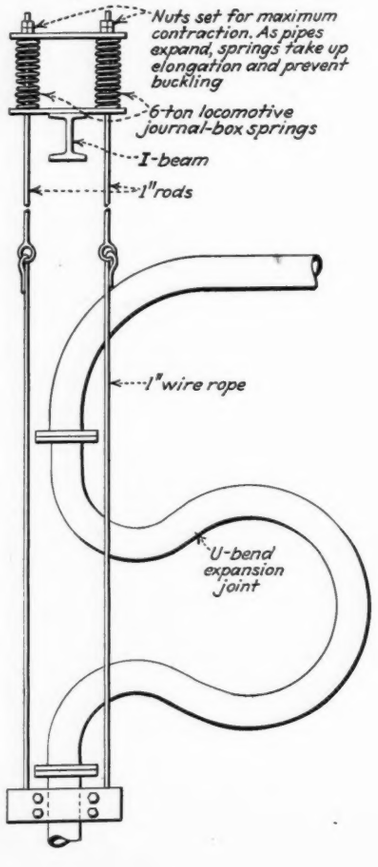
this method are better roof conditions and easier winning of coal, with comparatively less timbering and greater safety.

The caving chamber is driven in conjunction with an airway, both of which are advanced a considerable distance before driving of the haulway is begun. This schedule allows the roof to cave over the chamber and to come to rest over the area through which the haulway is projected before the latter is actually driven. How effective the caving chambers really are is evidenced by results illustrated photographically in Figs. 2 and 3. The haulways are driven by hand, it being necessary to take bottom in them, using Ingersoll-Rand jackhammers, Type BCR 430, as the coal is only 44 in. thick. But the caving chamber and complementary airway are advanced with conveyors.

Much of the relief afforded by caving no doubt is influenced by the character of the immediate roof. It consists for the most part of fairly soft shales which in places are interstratified by a comparatively sound black slate. A rider seam, 6 to 8 in. thick occurs 5 to 7 ft. above the main bed. In thickness the cover varies from 450 to 550 ft. The height to which caving in the caving chambers extends obviously has not been definitely determined. It may be conjectured that these caves extend upward through soft measures as high as physical laws governing arching permit. Estimates place the height of these caves at 40 ft. or more. The method is being tried in mine areas at Ehrenfeld where a sandstone, about 30 ft. thick, occurs at an elevation of about 22 ft. above the coal, but the effect has not yet been determined.

As will be seen in Fig. 1, the two initial rooms in a panel are only 20 ft. wide on 40-ft. centers. The roof is invariably heavy at this point and wide rooms cannot be driven. As a matter of fact, the driving of the initial rooms narrow is not easy and in no instance has it been possible to drive both to full length. But by the practice of perseverance and the use of much timbering one of these rooms is completely mined and much of the pillar taken. After that is accomplished a cave occurs and no further trouble is met in working subsequent rooms though they be driven wide. Here again the favorable influence of preparatory caving comes into play.

Fig. 4—Expansion Take-Up



Of interest secondary only to caving action is the ease with which pillars may be taken in this system. Except for an occasional pop shot, explosives are not used in pillar mining. After being cut, the coal is taken from the pillar by shovels with limited use of picks. Pillars are mined by slabbing cuts slightly angled from the room line. In this work portable chain-flight conveyors are installed along the pillar cut and discharge into a shaker. These units are double-shifted in first mining and triple-shifted in room-pillar work. Entry driving by hand loading into mine cars also is triple-shifted.

In room work eight men usually compose a conveyor crew. One man is stationed at the entry end of the shaking conveyor and the remaining seven work at the two room faces. Five of these seven men work in one room, loading coal, timbering and doing other jobs while two men cut and otherwise prepare the face of the second room. Each room is equipped with a cutting machine and an Ingersoll-Rand, Type C, rotary coal drill.

Some crews in room mining work better when divided into two groups of three men each, in which case the extra man, serving as boss, assists both groups alternately. Cutting, drilling and loading then proceed simultaneously and in rotation across the faces. Sometimes a young worker is added to the crew, his job being to pick refuse from the coal at the end of the shaking conveyor. In room-pillar work two crews are divided into three crews of five men each. The extra man is assigned to the shift needing his services most. A crew of seven men is used in the recovery of

heading pillars and stumps and the work is double-shifted.

Complete mining of a pair of rooms and the intervening pillar, an excavation about 310 ft. long and 100 ft. wide, takes 24 days ordinarily. The average production per day in the mining of this area is about 190 tons or nearly 12 tons per man-shift. There is practically no difference in the output per man as between room mining and room-pillar extraction. In the taking of heading stumps and pillars by conveyors the average shift output per man is 8 tons. The men on conveyors are paid a group or crew tonnage rate, the gross of which is divided equally among them.

Six batteries of conveyors are installed in the No. 3 mine. Five of these are in the "F" heading mine section and are driven by air supplied from the central compressor plant. Of this group three are used in room work, one is used for driving caving chambers and companion airways and the last for pulling heading stumps. The sixth battery is installed in another section of this mine and is driven by portable compressors. It is utilized for taking heading stumps and chain pillars.

During August, this year, which was the last completed working month prior to the writer's visit to this plant, these six batteries produced an average daily output of 839 tons for 27 working days—equivalent to 11.5 tons per man per shift. Of the average daily conveyor yield, 727 tons came from the compressors driven by air from the central compressor plant. In the period between Oct. 1, 1927 (when the compressor plant was first put into full-time operation), and Aug. 31, 1929, the output originating from air-driven conveyors in No. 3 mine totalled 351,903 tons. This tonnage reflects an operating experience of sufficient magnitude to establish authority in the conclusions of this management regarding the merits of compressed air.

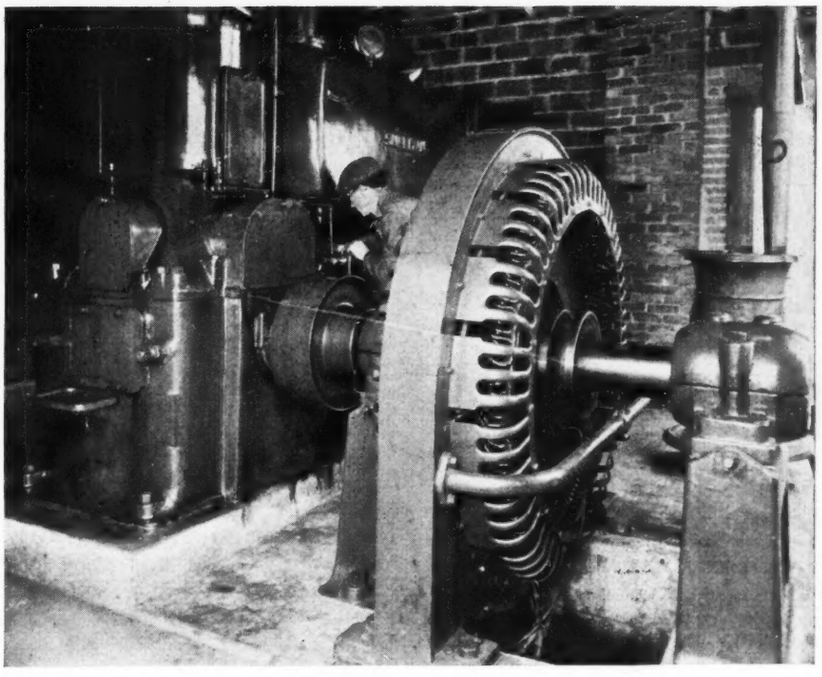


Fig. 6—One of Two Main Compressors

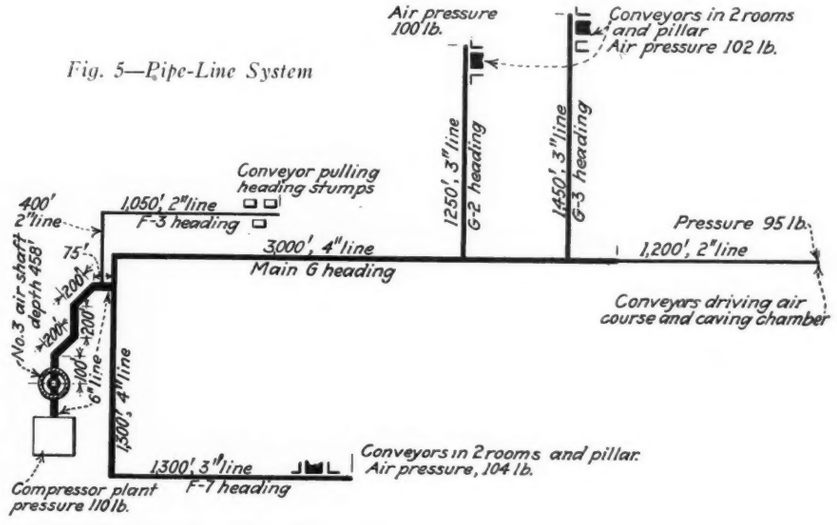
The shaking conveyors are Eickhoffs. Though only four complete shaking conveyors are needed at any one time, the mine is equipped with five drives, one being carried as a spare. The spare drive is used to facilitate new set-ups and also to allow systematic maintenance without operating delays. These drives are of the M E 325 type, with a weight of 890 lb. and a maximum stroke of 15¾ in. When a shaking conveyor line is fully extended (350 ft.) the drive consumes about 200 cu.ft. of air per minute, where the workings are level or practically so.

Pans are of the roller-cradle type, with a cross-sectional trough area of 70.3 sq.in. A telescopic trough section is installed as the last pan in each conveyor line. By this arrangement the conveyor line can be lengthened during the taking of one or two face cuts without adding standard pans.

All of the flight conveyors are made in the company's shop. They are of the single chain type, of a size to handle a maximum of 30 tons per hour. Coal-drill motors have been adapted to the driving of these units. The motor is anchored with its shaft horizontal and is attached to the shaft of a sprocket drive through a chuck coupling. The shaft thus extended is held by an outboard bearing between the chuck and sprocket. Maximum air consumption by one of these motors in conveyor service is about 50 cu.ft. per minute.

It was with no small degree of trepidation that the company approached the problems relating to the transmitting of air over comparatively long distances. Its experiences of 25 years ago were anything but encouraging, for an air installation having a pressure of 90 lb. at the compressors fell to about 30 lb. in being transmitted 1½ to 2 miles to the working faces. Distribution of air in those days was by taking off small-pipe branches from the main line. Precise engineering and construction methods for the installing of long lines were not known. The pipes were not gently

Fig. 5—Pipe-Line System



curved; elbows were frequently used; pipes were not carefully aligned or solidly supported and leaky joints were accepted as inevitable. However, methods have changed with time and the company was assured by bidding manufacturers of needed equipment that efficiencies calculated would be realized in the completed job. Performance values, as calculated, were high; but they were lower than the efficiency values actually achieved in operation.

The compressed-air plant is built around two Sullivan angle compound compressors, each direct-connected to a General Electric 200-hp., 2,200-volt synchronous motor. These compressors have a low- and high-pressure bore of 18 and 11 in. respectively, with a common stroke of 14 in. Each has a displacement capacity of 1,051 cu.ft. at 275 r.p.m. and affords a maximum working pressure of 130 lb. But as adjusted for operation at Ehrenfeld, these compressors unload at a pressure of 110 lb.

Cooling is effected by water from a mountain stream impounded behind an earth dam and by a spray pond. Much of the efficiency of the plant is the reward of pains in removing heat and moisture from the compressed air. On leaving the compressors the air is passed through two after-coolers each with a capacity of 1,000 cu.ft. The main air receiver, measuring 4½ x 14 ft., is equipped with a Crane tip-tilt water trap. Many traps are installed in the pipe lines underground.

In Fig. 4 is shown the pipe-line layout. The compressor plant is located at No. 3 airshaft, 458 ft. deep, down which the air is carried in a 6-in. line. Branch lines are made up of 4-, 3- and 2-in. pipes. The combined length of all pipe lines is 12,183 ft. and the length of the longest continuous line is 5,433 ft.

A pressure reading for each line terminus where an air receiver is installed is given in the layout sketch. Whereas the working pressure at the compressors is 110 lb., readings at the conveyors are 104, 102, 100 and 95 lb., the last being for the most remote terminus. While the air on leaving the compressors is cooled to the limit of practicability, temperature drops of considerable magnitude occur between the compressors and the conveyor terminals. These temperature drops together with friction losses largely account for the differences in pressure. Temperature readings taken on a day when the outside atmosphere was 50 deg. F. gave the following results: The temperature of the air on leaving the compressor was 200 deg.; on leaving the aftercooler and entering the receiver it was 168 deg. and in the 6-in. line at the top of the shaft it was 120 deg. A reading in one of the underground receivers registered 53 deg., with a mine-atmosphere temperature of 58 deg.

Practically none of the pressure drop could be due to leakage, so well constructed are the pipe lines. Expansion and contraction of the 6-in. pipe suspended in the shaft, where greatest strain is put on the line, is compensated for by a spring suspension in conjunction with a large U-bend expansion joint as illustrated in Fig. 4.

In laying the lines every ingenuity was practiced to avoid leaks and to minimize friction. The best grades of pipe, smooth inside, were selected. All were carefully aligned and leveled and supported on brick or concrete piers where necessary. The 6-in. pipes, suspended in the air shaft and extended underground for a distance of about 775 ft., are of wrought iron. In the 6-in. line in the air shaft alternate joints are of extra heavy (low-hub), rolled steel Van Stone flanges and the others are recessed hydraulic couplings. In the 6-in. line extending from the shaft the joints in the main are of the recessed hydraulic-coupling type, with a screwed, forged steel flange insertion at intervals of 200 ft. The remaining lines underground are of seamless steel tubing, with forged steel companion flanges of the screw type at intervals of 100 ft. and intervening joints are of the recessed coupling type.

Table I—Cost of Compressed-Air Equipment at Ehrenfeld

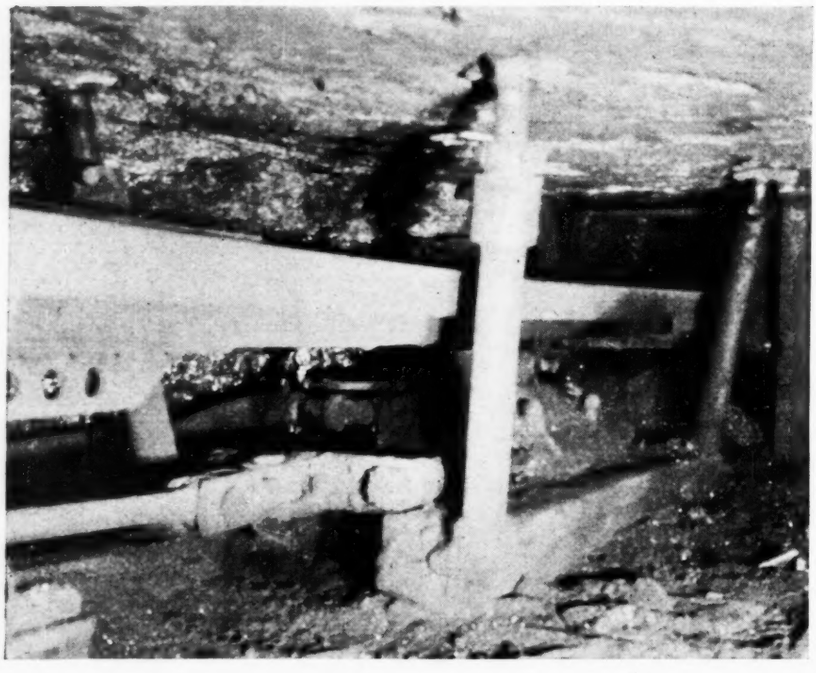
Compressor plant	$20,048.69
Cooling system	4,784.99
Air lines	10,889.88
Conveyors	17,240.91
Drills and accessories	2,635.00
Total	$55,599.47

USE of flanged couplings allows convenient repairing of any pipe section without disturbance of the remainder of the line. Joints were sealed with a mixture of litharge and glycerine and they are butted tight, The construction of these lines has demonstrated that leakage can be wholly avoided by care in the initial installation and in subsequent maintenance.

Maintenance requirements of the compressor plant and of the pipe lines have been slight during the two full years of operation. All air drives on the conveyors have not cost more than $25 a month for labor and materials for maintenance.

A statement of the cost of the compressor plant and the air-driven equipment is given in Table I. On the basis of a daily output from these units of 727 tons, as established during August, 1929, the installation cost per ton of daily capacity was $76.45. In the first eight months of 1929 the compressor plant consumed 610,520 kw.-hr. for the mining of 125,808 tons, an average of 4.85 kw.-hr. per ton.

Fig. 7—Why Air Drives Are Advantageous



How to Cut Coal-Mining Costs

West Virginia Institute Theme

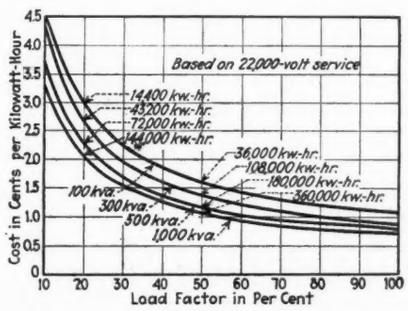
PRACTICAL methods of cutting operating costs in coal mines occupied the attention of delegates to the twenty-second annual meeting of the West Virginia Coal Mining Institute, held at the Fairmont Hotel, Fairmont, W. Va., Nov. 26-27. More efficient use of purchased power, newer methods of shooting, mechanization of mines, cost-cutting by organized safety, and haulage and ventilation improvements were discussed in search of advantage for the industry.

At the annual election, E. L. Griffith, mine inspector, West Virginia Department of Mines, Clarksburg, W. Va., was chosen president for the coming year, and Charles E. Lawall, head, School of Mines, West Virginia University, Morgantown, W. Va., was elected secretary-treasurer.

At the opening session on the morning of Nov. 26, presided over by Professor Lawall, L. L. Bailey, general manager of sales, Monongahela West Penn Public Service Co., Fairmont, W. Va., talked on the "Importance of Intelligent Use of Purchased Power." In the period of revamping of organization and methods caused by the present competitive markets of the coal industry, machinery is occupying a more important place than in the past. Though power costs for a bituminous coal-mining load are, on the average, less than 5 per cent of the total operating costs, they are nevertheless deserving of consideration on the part of engineers and operating men of the industry.

A graphic explanation of a rate schedule applicable in the Fairmont region is shown in Fig. 1, and indicates the unit costs as the amount of energy purchased varies. Lowest unit costs are obtained at 100 per cent load factor, which is the ideal. Consequently the first step in obtaining lower costs for power would be to maintain the lowest possible demand and make the greatest use of the service, thus purchasing requirements at the lowest cost part of the rate. A more detailed analysis of a power rate applied to an actual mine load in the Fairmont region is given in Fig. 2. It shows that, in a well-operated mine, the power cost decreases as the production increases, providing advantage is being taken of off-peak operation and improvement in power factor.

Fig. 1—Graphic Representation of Power Rate Applicable to Coal-Mining Loads



The unit cost of power paid by the operator is determined by the rate itself and does not vary a great deal with the production. It should not be confused with the cost per ton. Whether production is increasing or decreasing makes little difference in the long run, as the unit costs are practically the same in each case. Many operators are inclined to conclude that electric rates have been increased if their cost per ton increases when, as a matter of fact, the rate has remained the same. In Fig. 3 the trend of the cost of power and other staple commodities used in mining in the Fairmont region is contrasted for the five-year period 1925-29. Power costs have declined as a result of more careful use, while others have remained fairly constant.

In a campaign to reduce power costs under any rate schedule, the methods used may be grouped in two classes: (1) Those that require little or no investment, and (2) those that require expenditures before savings can be made. Methods included in the first group are as follows: reduce fan speed at night and on off days; pump at off-peak periods of the rate schedule; rearrange operating schedules of haulage locomotives; remove from service transformers that do not eliminate losses; interlock coal and man hoists to prevent simultaneous operation; adjust generator field settings at proper position for maximum power factor; cut coal at times other than when haulage is at its peak, and maintain bonding in proper condition.

Methods requiring additional investment are: replace d.-c. motors with a.-c. to eliminate losses in generating sets or rotary converters; replace over-motored equipment with proper sized motors; consider installation of equipment to improve power factor; look into the possibilities for savings offered by the use of "demand limiters"; eliminate unnecessary metering points; meter all house-lighting loads to cut waste; consider increasing copper feeders, strengthening rail bonds and relocating generators as close to load centers as possible.

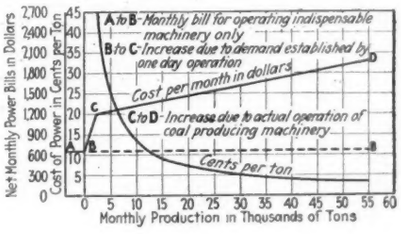


Fig. 2—Graphic Representation of Power Costs, in Terms of Production, as Taken From a Northern West Virginia Operation in 1928

"Cardox, the Permissible Blasting Device," was discussed by Edwin H. Johnson, Safety Mining Co., Chicago. Three mining operations in southern West Virginia, he remarked, where the coal ranged from 38 to 84 in. in thickness, decreased their slack production 13.6 per cent and increased their sales realization 14.27 per cent.

The extra cost of Cardox was 6.7c. per ton and the increase in selling price was 20.97c. per ton. Production of nut and pea sizes are affected only slightly by the use of Cardox, the greatest increase being in lump and the greatest decrease in slack.

"Mechanical Loading With Conveyors" was the title of a paper by L. H. Schnerr, division manager, Pennsylvania division, Consolidation Coal Co., Somerset, Pa., read by Charles Hagenbuch, chief mining engineer, Consolidation Coal Co., Fairmont, W. Va. This paper, which

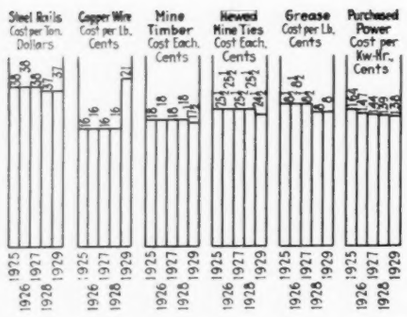


Fig. 3—Purchased Power Cost Trend in Northern West Virginia as Compared With Other Commodities Purchased for Mine Use

describes a mine in a 30-in seam in which the coal is 100 per cent mechanically loaded, is reported in detail on page 752 of this issue of *Coal Age*.

Three reasons for the growing importance of accident prevention were given by E. H. Shriver, superintendent, American Rolling Mills Co., Nellis, W. Va., in discussing "Accident Prevention in Mining." These are as follows: Growth of civilization with attendant humane ideas on safety; recognition of the idea that accidents retard efficiency, make for higher costs and demoralize organization, and the growing cost of compensation and rehabilitation.

The game of accident prevention is largely a psychological one and there are certain definite rules that must be observed if it is to be successful. To insure that the greatest benefits accrue, the employer must not only play square but he must convince the employee of his sincerity.

It should be perfectly obvious that no company can reasonably expect to be successful in safety if the property is permitted to retrograde physically. It is here the financial management must have the courage and vision to authorize the expenditure of money necessary to place the property in as good condition as is possible.

When the safety idea is sold to the financial management the operating management must assume the burden of rehabilitating the property. When that has been done, an organization should be provided to keep it in that condition. After that the real job begins, that of selling the safety idea to the workers and obtaining their full co-operation. Most programs do not go far enough, as safety, to be successful, must be a 24-hour subject.

Safety meetings should be held at stated intervals, not only for the employees but for women and children also, as their interest is a powerful weapon in keeping the men in line. When the idea of the safety program —"it should be a program, not a campaign"—has been driven home, work on standards or systematic methods of performing mine operations should be started.

Responsibility for accidents must be placed as near the source as possible—the section foreman. Supervision on his part must be of high order for success. But when responsibility is placed on him it must also be accompanied by the authority necessary to maintain mine discipline. In addition, he should be given supplies when needed. Constant changing of foremen must be avoided, because of its demoralizing effects on discipline, and rules for safe operation should be adopted and rigidly enforced. As the safety program develops, systematic inspections of the mine should be made by some member of the operating organization each month. To stimulate pride and interest, prizes may be offered for the best kept places.

IN CARRYING out the safety program at Nellis, each man is given a physical examination before being employed. After he goes to work every effort is made to see that he receives immediate medical attention for any injuries received while on the job. This system is carried even farther to the extent that, in the evening, all men are examined upon coming out of the mine and injuries are inspected and dressed.

Acceptance of the safety idea by the worker is to a considerable extent dependent upon the health of himself and his family. Cleanliness in the town is an important but often neglected factor and bathhouses for the men go a long way toward putting them in the proper frame of mind. This idea is carried out even in the schools at Nellis, where teachers are behind the program of health and safety. In addition, each employee is a member of the Armco Association, which serves him and his family in event of his illness or injury and also is an agent for social gatherings. Benefits are paid to any employee who becomes sick or is injured, thus maintaining his family in comfort and eliminating the subscription list.

Since 1926 the tonnage at the Nellis mine has increased 25 per cent. On the other hand, as a result of a careful and painstaking safety program, labor turnover decreased 50 per cent, tonnage per accident increased 400 per cent, and the number of accidents was cut 70 per cent.

The "Question Box," a new feature at meetings of the Institute, aroused spirited discussion among delegates to the meeting. W. E. Fohl, consulting mining engineer, Pittsburgh, Pa., and N. A. Elmslie, general superintendent, Marion division, Bethlehem Mines Corporation, Barrackville, W. Va., presided during the debate on the three questions asked.

In answer to the first question—"Which is the most efficient haulage unit—battery, locomotive or stock? Would crab or cable-reel locomotive be preferable to either of these?"—L. M. Thomas, vice-president, Carbon Fuel Co., Carbon, W. Va., in a written discussion, detailed the experience of that company with cable-reel and battery locomotive units.

D. L. McElroy, research fellow in mining, School of Mines, Morgantown, W. Va., gave some figures on haulage from a study of 42 mines in various fields in the state. Cable-reel types seemed to be preferred and crab-reel types were popular only in the Panhandle region.

The distance traveled by both locomotives and stock in the fields of the state are given in the accompanying table. It was found that in all cases the locomotive got a higher tonnage per unit. The higher mileage per animal was due to the fact that animals pulled only one car at a time and thus traveled farther for their tonnage. The range of distances hauled was 1,000-1,500 ft. for animals and 1,000-3,000 ft. for locomotives.

Average Distances Traveled by Gathering Units in West Virginia

Field	Miles per Day—Locomotives	Miles per Day—Stock
Pocahontas	2.51	2.57
Logan	3.94	5.30*
Williamson	3.87	....
Winding Gulf	3.02	....
New River	2.45	....
Kanawha-Greenbrier	4.04	10.23*
Fairmont	3.60	6.90

*One mine only.
In seven mines in the Panhandle Field, miles per day per locomotive varied from 1.88 to 6.3; miles per day per animal from 1.86 to 7.38.

Charles Hagenbuch, in answer to the second question—"What advantages can be gained by intensive mining?"—recounted the superior features resulting from getting the same tonnage from one mine as against four or five smaller ones. These were: more advantageous use of equipment; power savings resulting from avoidance of unnecessary duplication of machinery; concentration of supplies with better supervision of their use; decreased supply inventory; reduction in labor cost and supervision; better preparation by better or more advantageous

screening facilities; closer inside and outside supervision; greater return on each ton mined through reduction in number of day men; elimination of idle day labor; reduction in maintenance on idle buildings, and more economical transportation through dispatching and better grades.

N. A. Elmslie agreed with Mr. Hagenbuch and outlined actual accomplishments at the Barrackville and Dakota mines of the Bethlehem company. He advocated the reduction of excess territory and the more intensive working of that retained. The most important result was the fact that hand loaders earned more than before. Day labor may be up to 50 per cent of total labor cost. Then if by concentration the tonnage from the loader is doubled, the service he requires is reduced, enabling him to earn more.

"What are the principal points of attack in setting out decreased ventilating costs, keeping everything consistent with safety and good mining practice?" was the third and last question. H. S. Bell, chief gas inspector, Consolidation Coal Co., Fairmont, W. Va., started the discussion by saying that sufficient air is the first requisite in a safety program. Causes of ventilation inefficiency are as follows: Fan not suited to mine conditions or inefficiently operated; congestion, insufficient number of airways or leaky stoppings cause power losses, or the area on one split is excessive. In improving ventilation, the logical place to start is at the fan.

The problem, then, is the reduction of losses, which may be accomplished by changing mine resistance to suit the fan design; replacing the fan to meet new conditions; driving additional openings to cut down air travel, or by moving the fan to a new location nearer the active portion of the mine. The latter is governed by the depth of cover and the life of the mine. In most cases ventilation troubles lie less than 2,000 ft. from the fan. To check losses in pressure and volume, stoppings on the main aircourse should be of stone, brick or concrete. Afterward they should be carefully and regularly inspected for leaks. Tile is not satisfactory, as its crushing strength is too low.

In coursing air in splits, the practice of putting an excessive mine area on one air stream requires too many doors, with consequent losses and interruptions in the air current. Where this practice is followed, large volume is necessary, as usually not more than 10 per cent reaches the last working place. In addition, the surplus doors present added hazards. Bad conditions may often be improved by building overcasts, shortening splits and overhauling airways. From this standpoint the main airway presents the best opportunities for improvements.

To insure efficient ventilation, several factors should be considered, as follows: properly motored fans; reduction of leakage losses to a minimum; careful inspection of airways; construction of overcasts; establishment of splits and removal of excess doors where possible, and care in seeing that the air is properly conducted to the working places.

In answer to a question by Mr. Elmslie, Mr. Bell explained that in a mine with several splits, the open split, or one on which there is no regulator, governs the water gage and should receive first attention in a ventilation improvement campaign. On this split the velocity is highest and offers greatest opportunity for economies.

The altimeter may be depended upon to give a complete picture of ventilation conditions, Mr. Elmslie said, but at Barrackville and Dakota, the way in which the wind whistled past a man's ears was relied on in correcting conditions. In this way the short-circuited efficiency was so increased that that of the whole mine could not be increased over that of just the airshaft alone. After this was done, refinements in the survey were introduced to determine velocities at which the water gage was developed and all difficulties thereby eliminated.

R. L. Kingsland, in charge of the electrical and mechanical departments, Consolidation Coal Co., Fairmont, W. Va., emphasized the fact that fans frequently were not installed in accordance with mine conditions. Ordinarily they operated at a decreased efficiency, and he advocated the purchase of fans with a little larger working range to compensate for this decreased efficiency under operating conditions.

THE question of how long, with present-day rapid extraction, a fan could maintain its efficiency at that point on the efficiency curve at which it was purchased was brought up by Adam Crawford, assistant director of mining extension, School of Mines, Morgantown, W. Va. In reply, Mr. Elmslie said that it was not a question of years but of projection, as a fan could easily have a life of 20-30 years if an effort was made to maintain conditions similar to those for which it was designed. In use, an effort should be made to balance mine conditions with the fan as long as possible.

There possibly might come a time when this could not be done but with care a mine could be projected and maintained to preserve an equivalent orifice equal to that of the fan. The distance of the workings from the fan need not be the governing factor as long as the relative area is not allowed to increase. Mr. Kingsland agreed with the latter statement and said that if the airways were adequate, approximately the same conditions could be maintained throughout the life of the mine if new sections were added only as fast as the old were abandoned and sealed. The technical session was followed by a dinner for delegates on the evening of Nov. 26 and inspection trips to near-by mines on the following day.

Things to Do for Safety

The organization of an accident prevention program requires that:

(1) The management must be interested and willing to spend money to put the property in shape.

(2) Operating men must put safety before all other considerations.

(3) Responsibility for accidents must be placed as near the source as possible—in other words, on the section foreman.

(4) Material, supplies and labor necessary to keep his section in a safe condition must be promptly and unfailingly supplied the section foreman.

(5) The whole-hearted co-operation of the employees must be obtained.—*E. H. Shriver, before the twenty-second annual meeting, West Virginia Coal Mining Institute, Fairmont, W. Va., Nov. 26.*

Down Go 10 Out of 12 Mines

...OF BOONE COUNTY COAL CORPORATION...

UP Goes Total Tonnage!

By J. H. Edwards
Associate Editor, Coal Age

STATIC INERTIA of management was the downfall of many of those corporations which failed to survive the tremendous economic changes of recent years. In general, coal mining, like most other enterprises, cannot be conducted in that "same old way." The management must be open-minded and ready to adopt new ideas and methods to meet the press of competition. The Boone County Coal Corporation, operating in the Coal River field of West Virginia, stands out as an example of a company where the existing management spied the beacon of progress and set a course in that direction.

A number of small mines were shut down, the output of other mines increased, and the work concentrated by systematic working and robbing, which heretofore had appeared to be impossible in that locality. Main haulways were changed from undulating tramways to "railroads" equipped with 80-lb. steel, and mechanical cleaners were installed at the tipples. Commissaries were changed from "ordinary company stores," struggling against the competition of chain stores, to neat mercantile establishments that reduce the cost of living for the miner and operate on a paying basis.

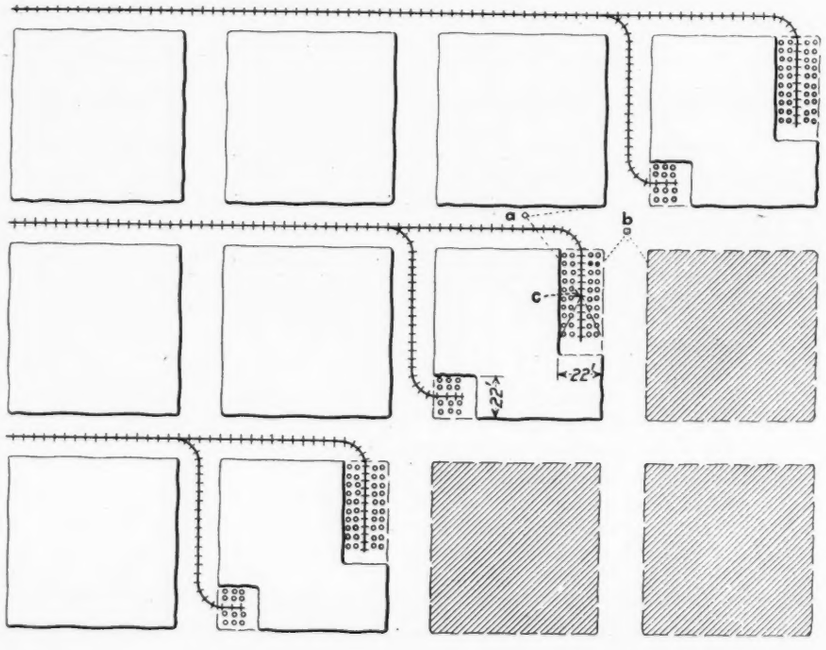
Holdings of the Boone County Coal Corporation comprise an area of 35,000 acres, owned in fee and bearing several workable coal seams. A few years ago the corporation operated twelve mines on the property. Now it has closed all but two, and produces more coal than it did formerly from the twelve. In August, 1929, the No. 2 mine shipped more coal than any other mine on the entire Chesapeake & Ohio Railway system.

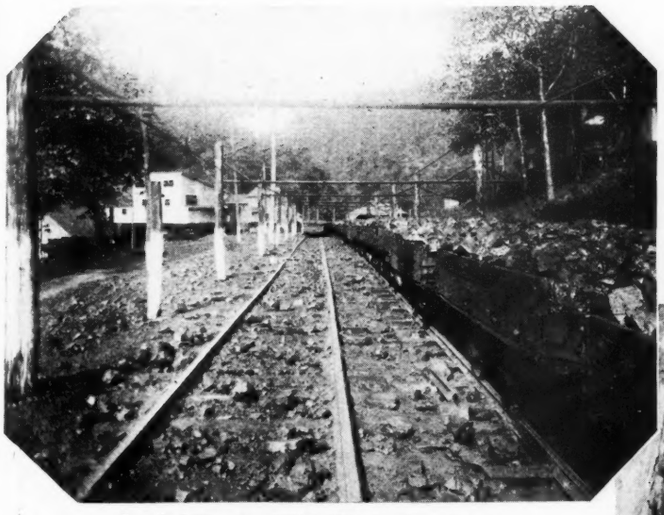
The coal, which is in the Chilton bed, lies generally level, averages 6 ft. in thickness, and is without regular parting. Above it there is a 2-ft. ceiling of drawslate which cuts rapidly when exposed to the air. The roof above this is generally strong, consisting of a hard slate in some places and of sandstone in others. In the mining, 6 in. of coal is left in place at the top to hold the drawslate. The top cutting is done with Jeffrey 29B arc wall machines.

This mine, like others in the vicinity, was operated for many years without successful pillar robbing, and consequently, considering the tonnage produced, it was spread over a large area. It is a drift operation with cover ranging up to 1,200 ft. Attempts have been made to rob pillars on a line parallel to the room entry. Roof weight, however, caused abandonment before sufficient span was developed to bring the first break. In the robbing now being done, the pillar lines are at a 45-deg. angle to the room entries and the locations for starts favorable to first breaks were selected so far as possible with proper respect to the contour of the mountain surface above. "It is just as necessary to study elevations as it is to study the plan," was the brief comment of A. S. Wilson, general superintendent, regarding the roof action.

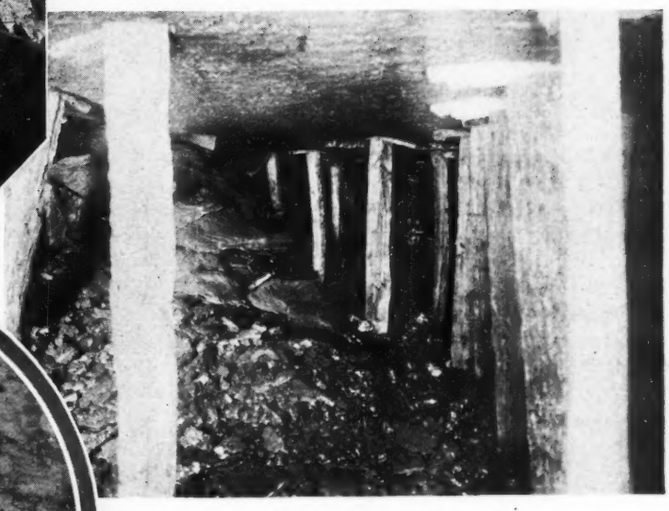
The pillar blocks, which are approximately 78 ft. square, are worked by driving across the open end and at the same time along the back, as shown by the accompanying sketch.

Illustrating Method of Robbing Pillars and Showing Camera Locations When Pillar Photographs Were Made





Loaded Tracks, With Tipple Showing in the Background



Pillar Robbing View From Point "b" on Sketch

New 80-Lb. Track on a Section of the Main Haulway, Where 5½ Ft. of Top Has Been Shot Down. The Line Along the Rib Just Above the Bottom Is the Top of the Coal. Filling the Track Is Yet to Be Done

Pillar Robbing View From Point "a" on Sketch

Pillar Robbing View From Point "c" on Sketch

The end place is kept four cuts ahead of the other. By this plan, providing two working places per block, production is concentrated and the robbing speeded. Nearly 50 per cent of the timber is recovered and not often is any appreciable quantity of coal abandoned at the corner next to the general line of break. The pillar coal is top cut with the same type of mining machine that is used in driving the rooms and entries.

More than 4,000 ft. of main haulway has been re-laid with 80-lb. steel on 7-in.x9-in.x6-ft. ties. Along one stretch of 1,200 ft., this haulway has just been graded to an average of 6 ft. The mine tracks are 44-in. gage, and the main haulage equipment consists of one 10-ton and three 15-ton locomotives. The gathering is done by 13 cable reel locomotives, of which 8 are 6-ton General Electric and 5 are 6-ton Jeffrey. The mine cars have a capacity of $2\frac{3}{4}$ tons and are equipped throughout with anti-friction bearings.

Left to Right: Col. W. M. Wiley, Vice-President and General Manager; H. L. Copher, Superintendent No. 2 Mine; and A. S. Wilson, General Superintendent.

From a rotary dump the coal goes to a preparation plant which has five loading tracks. In the plant is a Marcus screen equipped with a picking table, and four Simplex jigs. Two of the jigs clean $2\frac{3}{4}$x4-in. egg, and the other two, $1\frac{1}{2}$x$2\frac{3}{4}$-in. stove.

The production per loader at No. 2 mine has been raised to an average of over 14.5 tons. Closer co-ordination of jobs, improved car distribution and more strict supervision has brought this result.

In addition to these general improvements in mining practice, Col. W. M. Wiley, resident vice-president in charge of operation, views with great satisfaction the results of a radical change in the policy of conducting the company stores or commissaries. Presumably these stores once had the typical air and appearance of the ordinary coal-mine commissary, but now no suggestion of such a picture is left.

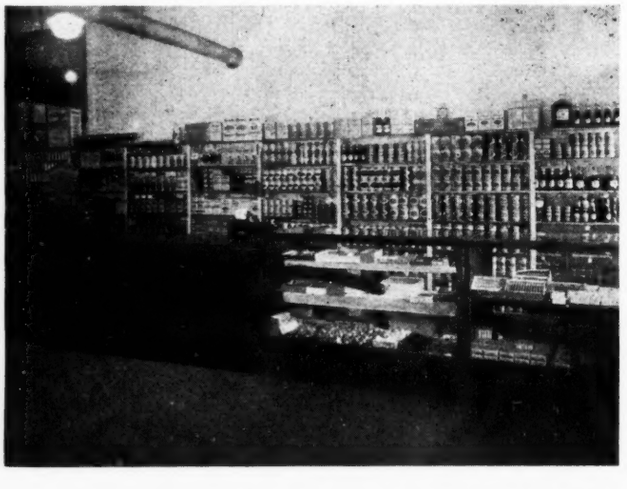
Colonel Wiley affiliated his stores with the Independent Grocers' Alliance, known as the "IGA," and dressed up the buildings according to its recommendations. Eight hundred to a thousand dollars per store was spent in building new shelves, effecting rearrangements and decorating. The shelves are of the type which display the maximum amount of goods within the normal angle of vision. Price tags are displayed on each grocery item, and the other classes of goods are arranged, each in its own section or shelf space, with that space labeled, "Notions," "Underwear," "Hosiery," or otherwise, as the case may be.

Reduction of prices to compete with the chain stores and the running of weekly specials to call attention to the low prices brought a trade increase which put the stores on a paying basis. One miner, who has a large family, declares that the price reduction is saving him $20 per month on his grocery bill.

Much has been accomplished toward modernization of equipment and methods at the Boone County Coal Corporation mines, but the management disclaims any approach to the ultimate; in fact, it has plans for many other improvements to further fortify the company's position.

View in the Store at Blair— Dry Goods and Notions at Left, and Meats at Right

Grocery Side in the No. 12 Mine Store at Blair



Consumers Wreck Industry, Gebhart Tells Illinois Men

THAT the anthracite region is not the only one to have suffered from consumer antagonism was argued by B. R. Gebhart, public relations counsel, Illinois Coal Bureau, at the meeting of the Illinois Mining Institute, held in Danville, Ill., Nov. 8. He declared that dealers throughout the markets tributary to the Illinois coal fields expressed bitterness against the union miners and against what seemed to the dealers the entirely unwarranted procedure of the miners in Illinois at various times.

Because of strikes, dealers have turned to other producing fields. Changes in freight rates since 1924 also have facilitated the penetration of Eastern coals into the primary markets of Illinois. These changes have had the enthusiastic approval of the consumers, but no such enthusiasm has been expressed for reductions in rates on Illinois coal, and until the consumer takes another view of the situation there is little hope of a reduction of Illinois rates.

"During the disturbances and shutdown periods in this state, Eastern coal became the bulwark of many of our former dealers, who set about diligently exploiting and selling Eastern coals and extolling their qualities to domestic users. Illinois must patiently and unremittingly cultivate, in the minds of dealers and steam users alike, the outstanding economic superiority of Illinois coals properly used.

"West Virginia and east and west Kentucky are now going through the process of post-war adjustment and the elimination of excess mines, an experience that in Illinois is a matter of history. This is clearly indicated by the highly competitive abnormally low prices, erratic and extremely variable current and contract prices on coals from these Eastern fields and widespread provision of unjustifiable and unsound credit terms to dealers throughout our normal market territory.

"As much of the Eastern coal, being hard and blocky, stands rough treatment and exposure to weather, dealers have to an increasing degree each summer taken in large stocks and stored them until the fall demand to obtain the indicated low prices. In addition to credit extensions for the coal itself they have also received in many cases 90 to 120 days' credit on the freight charges.

"Most of the better type of dealers admit that the policy of these Eastern purveyors is poor merchandising. They realize there are no heat units in freight and that in the final analysis Eastern coals do not justify themselves economically in the market. They still think highly of Illinois coals and in many cases would prefer

A. C. Callen

to handle them if it were not for the existing consumer demand."

Automatic firing, automatic ash removal and particularly damper regulation, said Mr. Gebhart, could have been achieved with domestic coal-burning equipment years ago and should be introduced now, because convenience and not economy is now the paramount consideration with many domestic buyers. It is interesting to note that in the last twelve months the number of coal-burning stokers installed in the city of Chicago has increased 400 per cent.

"THERE is a growing understanding," he added, "among coal consumers in the Middle West of the desirability and necessity for limitation of coal movement in normal channels and to normal zones. Long and cross hauls such as required to bring Eastern coals into this market are essentially wasteful.

"These factors, backed by steadiness in the production of coal, which I repeat, is fundamental, while exerting an influence distinctly of the 'long-pull' variety, point with quite assuring certainty to the re-establishment of Illinois coal more firmly in its primary markets."

At the opening session, J. E. Jones, president of the institute, occupied the chair. The first business was the adoption of the report of the nominating committee. A. C. Callen, dean of mining, University of Illinois, was elected president; J. D. Zook, vice-president, and B. E. Schonthal, secretary. The directors are: J. A. Garcia, J. A. Jefferis, W. J. Jenkins, George McFadden, A. D. Lewis, D. D. Wilcos, H. A. Treadwell, Paul Weir, J. E. Jones, Harry Moses, T. C. Mullins and J. S. Anderson.

Mr. Jones read a paper on the early history of the Illinois Mining Institute. Late in 1891 or early in 1892, James C. Simpson invited a large number of mining men to see the new 50-ft. Guibal fan he had installed at his mine. It was a time when inspectorates were being established and certificates of competency were being required of mine managers. These changes made mining men anxious to increase their technical knowledge.

As a result of the gathering, a call was made for a meeting on Feb. 17, 1892, to establish a technical study. At this meeting the Illinois Mining Institute was founded, with Mr. Simpson as president. Quarterly sessions were held, but the institute lasted only about a year, no session being held at the scheduled time in May, 1893, as far as can be ascertained. John S. Lord, of Springfield, was secretary. It was some years later when a new society bearing the same name was organized to renew the work thus discontinued.

IN THE afternoon under the chairmanship of Mr. Callen, following the address of Mr. Gebhart, Cloyde M. Smith, research associate in mining engineering, University of Illinois, presented a paper on "Some Recent Experiments in Mine Ventilation," covering the work done by the university to determine the resistances of aircourses and their laws governing those resistances.

He said that though the anemometer was the most suitable instrument for day-to-day measurements of air velocities, it was not sufficiently accurate for the determination of the laws of resistance of air currents. With the pitot tube duplicate traverses checked almost in-

variably within a few per cent, usually less than 5 per cent, where velocities of around 600 ft. per minute or higher prevailed.

Better control of air in coal mines is much needed. In a group of large mines, each capable of producing 5,000 tons of coal per day or more, one whose total quantity was not quite 90,000 cu.ft. per minute had one of two main splits that lost more than 5 per cent of its quantity within 300 ft. of the shaft.

The Atkinson constant k for resistance in units of 10^{-10} is 217. An untimbered airway fairly clean has an Atkinson constant in the same units of only 95; quite clean, the constant is 62; with smooth concrete ribs and roof it is 12; when the airway is slightly sinuous the constant is 35, and with rails across the roof it is 50. Where timbered with staggered posts the constant is 295 and where timbered with three-pieced sets with rough surfaces it has been found to be 157 in one case and as much as 246 in another. When the latter entry with its three-pieced sets was sheeted with boards the constant dropped to 20.

WITH DUST TROUGHS the resistance was eight times that of an equal length of a similar clear entry at mean velocity of 260 ft. per minute. With an overcast the resistance was six times that of an equal length of clean entry.

John Foster, superintendent, Orient No. 2, Chicago, Wilmington & Franklin Coal Co., West Frankfort, Ill., read a paper on "Mechanical Mining" in which he declared that the number of accidents per ton had decreased with mechanized loading. A. D. Lewis, chief state inspector, Springfield, Ill., said that the returns of the state seemed to show that fatalities per man employed had risen.

Mr. Jones said that the experience with the Old Ben Coal Corporation showed that the forecast reduction in accidents was not experienced at first but that when the men became more accustomed to their duties the accident rate declined. As the result of mechanization, injuries have been less severe than formerly. Fatal accidents have recently been cut in two. The record would be better if only the men in the working places were considered, as indeed they should be, because the men in the rest of the mines are exposed to precisely the same hazards as before. Loading mechanization can in no way reduce their accident rate.

At the banquet F. E. Butcher Danville, Ill., presided. R. Dawson Hall, the first speaker, expressed the conviction that low-temperature carbonization had increased its feasibility by reason of a clearer realization of the value of the byproducts and an augmented interest in smokeless, sulphurless fuel. He urged the members of the institute to promote the progress of the process —that meant so much to the industry in increased sales of coal—by advocating the use of the byproducts, especially Bakelite. Every industry was busily advancing its own interests by recommending and even advertising the uses of its products. The coal industry should do the same.

John A. Garcia, consulting engineer, Allen & Garcia, Chicago, Ill., gave a short talk on his trip to Russia. J. Lewis Earlywine, attorney, Chicago, delivered an address on personal liberty, arguing that the American public had more to fear from internal disagreement than from foreign invasion.

Budgeting: A Tool of Management in the Efficient Employment of Capital

(Continued from page 724)

location of expenditures by months, and properly list the above data on a prepared form.

When informal executive approval has been granted by the proper official of the company or the board of directors, the information thus listed will become the tentative estimate of contemplated expenditures for betterments and improvements for the ensuing year, and as such may be reflected in the budget of financial operations. Actual results will depend upon the accuracy of the estimates and the degree of adherence to the proposed program, but the compilation of the list will accord a definite place in the financial picture to known items of necessary expense and contemplated improvements.

All the forecast does is chart a path. Subsequent developments may show that it is unwise to follow this path in its entirety and it should therefore be scrutinized monthly and currently revised as conditions indicate the desirability or necessity of revision. There appears to be prevalent, to some extent, the idea that a budget, once adopted, constitutes a fixed, unchangeable working program. This can be true only in a degree and in the most stable industries, but, especially in coal mining, the efficient application of any kind of budget will necessitate its frequent revision to meet changing conditions.

Wholly unexpected developments may arise during the year which make it necessary or desirable to virtually discard all previous estimates and set up new estimates in their place. Flexibility, therefore, is a prime requisite in order that quick adjustments may be made to meet changing conditions or production demands.

It may, therefore, be asked "why attempt to budget at all if the program thus outlined and the figures thus set up, are subject to constant change?" The answer is that the figures are being altered month by month to conform to the new path which the company's business is taking, with this path forecast as far as possible in advance after a minute examination of all available information and pertinent facts. The expenditure of the company's money for betterments and improvements is under definite control and an agreed program is available which has been co-ordinated with the company's requirements and financial ability. In other words, the company's business is being consciously guided along a selected path toward a fixed goal of increased profits rather than allowed to flounder in the jungle of guesswork, hasty actions, and unjustified expenditures, which has in the past swamped a distressingly large number of otherwise promising coal mines.

It should not be assumed that the approval of a program for budget purposes should also constitute a working authorization. Authorization for work should be granted by items or related groups of items only after painstaking investigation and analysis have justified the expenditure from a profit standpoint or proved its necessity as an operating requirement. While written primarily from the viewpoint of the management of a group of mines, the procedure herein described may, with necessary modification, be profitably applied to the operation of a single mine even though of small capacity.

HOW TO KEEP *Electric Locomotives* CONTINUOUSLY ON THE JOB

[THE SECOND OF TWO ARTICLES]

By John S. Dean

Renewal Parts Engineering Department
Westinghouse Electric & Mfg. Co.
Homewood Works

ADEQUATE EQUIPMENT is the first step in efficient underground transportation. But, if equipment adequate at the time of purchase is to be maintained in first-class condition, there must be proper inspection and maintenance.

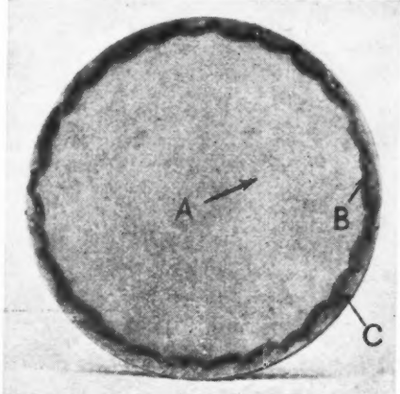
In the preceding article (*Coal Age*, Vol. 34, p. 686) an inspection system was outlined and the principles of effective maintenance as applied to motor armatures and motor frames were set forth. The present installment concludes the detailed discussion of maintenance of motor-frame parts and also takes up bearings, pinions, welding, mechanical parts and lubrication.

Housings or Frame Heads—These parts must be kept tight in order to prevent the wear not only of the housing but on the motor frame at the housing seat. The clamping bolts holding the motor frame halves together must be drawn up securely, as the clamping action of the frame, along with the bolts or dowels, prevents the housing from turning and working loose. Sometimes these parts work loose in service and as a temporary means of relief, shims are used to hold them in place. Best results are obtained by welding up the worn seats on the motor frame and remachining them to standard size and then using new housings.

Heat-Treated Bolts — Where trouble is experienced with motor frame and axle cap bolts working loose or breaking, some thought should be given to the use of special high-grade heat-treated bolts. Comparative tests show that a heat-treated axle, steel bolt has an elastic limit of more than double that of the standard hardware bolt. The heat treatment (quenched and drawn) makes these bolts both tough and strong. The amount these bolts will stretch without taking a permanent set (rubber-band action) is about double that of the standard hardware bolts. In general this type of bolt costs from two to three times as much as the standard hardware bolt, but experience has shown that it is good economy to use them, as they more than pay for themselves in reduced maintenance.

Armature Bearings: (a) Sleeve Type — The sleeve type armature bearings used on a large number of mining locomotive motors should measure up the following: (1) Shells made from a good grade of bronze alloy; (2) bore should have a smooth finish; (3) bearing bore need not be tinned or lined with a babbitt metal; (4) oil grooves should be cut in the bore, especially at collar end; (5) sides of window should be chamfered; (6) outside of shells should have a smooth machine-finished surface; (7) bearings should be given at least 0.006 in. initial clearance with the shaft; (8) bearings should be held preferably by a key in addition to a press fit of from two to five tons in the housings or heads.

Section of Welded Motor Shaft Which Has Broken in Service. A—Large Central Area of Original Material. B—Narrow Intermediate Zone of Hard, Brittle and Burned Metal of the Original Material. C—Outer Layer of Porous Metal Deposited During the Welding Operation.



(*b*) *Ball and Roller Bearings*—A number of the mine motors are fitted with ball bearings on the armature, and some few use roller bearings. These bearings should measure up to the following: (1) Balls or rollers, and both races should be made from a high-grade alloy steel, hardened; (2) inner race should have a tight shrink fit on shaft; (3) outer race should be a sucking fit in bearing seat on housing or head; (4) bearings be carefully handled and kept free from dust, dirt and moisture, during storage and when being applied.

Axle Bearings—Axle bearings are of the sleeve type and made in two halves so they can be applied to the axle without removing the wheels. Modern practice for axle bearings is somewhat in line with the following: (a) The half shells are made from a good grade of bronze alloy; (b) bore should have a smooth finish; (c) bore is not tinned or lined with a babbitt metal; (d) oil grooves are not considered essential; (e) sides of window and sharp edges at split should be chamfered; (f) outside of shells should be machined a smooth even finish; (g) initial bearing clearances on the axle should be at least 0.015 in.; (h) all shells should be held by dowels or keys in addition to clamping action of axle caps.

Some of the older types of motors use malleable iron shells lined with

babbitt metal and in some cases bronze shells are relined after being badly worn. If possible these should be replaced by new bronze bearings.

Babbitting Bearings

On the properties where it has been found advisable to rebabbitt bearings, the following points should be given consideration in connection with this work: (1) Shells should be thoroughly cleaned; (2) tin the shells in the bore before relining; (3) use a high-grade tin-base babbitt metal; (4) bearing shells and mandrels should be heated before rebabbitting; (5) babbitt metal should be well stirred before pouring; (6) babbitt metal should be poured while at a temperature of from 460 to 480 deg. C. (860 to 896 deg. F.); (7) give all babbitted shells a sound test by striking with a hammer. Those that give out a clear bell-like tone are O. K., while those that sound dead should be set aside and rebabbitted.

[Note: Best results are obtained in babbitting by the use of pots heated by electricity and fitted with automatic temperature control to properly regulate the temperature of the metal while being poured.]

Lubrication

Bearings should be properly packed and carefully and systematically lubricated. In this connection the following ten rules should be considered:

1. Use a good grade of long strand wool waste to pack the sleeve type bearings.
2. Use a high-grade car oil, summer and winter grade.
3. Journal bearings, if properly packed with thoroughly saturated waste and protected from dirt and water, should not need any free oil.
4. Pack bearings of the sleeve type (side feed), using a wick of long-fiber wool waste extending from the bottom of the oil well to the bearing window. Back up the wick by tamping waste in the waste chamber to keep the wick forced up against the journal at the window.
5. Axle bearings, top feed, will require oiling every morning.
6. Axle bearings, oil and waste, side feed, if properly packed and protected from dirt and water, require oiling every seven days.
7. Armature bearings, sleeve type, top feed, will require oiling every morning.
8. Armature bearings, sleeve type, oil and waste, side feed, require oiling only every seven days.
9. Lubricate the armature ball bearings with an approved grease, and not with oil.
10. Ball or roller bearings should be lubricated about every eight weeks, if properly protected from dust and dirt. The grease or oil level should be just above the top of the lowest ball or roller.

[Note: It is a recognized fact that considerable damage is done to the commutators of mine locomotive motors by the use of too much oil in the commutator end armature bearing. This should be guarded against.]

To reduce trouble due to loose pinions, arrange to heat them in boiling water for about one hour, and while hot drive them on the shaft. A buffer made of soft metal should be held against the pinion to protect it while driving it on with a sledge. A suitable pinion puller should be used to remove worn and damaged pinions from the shafts. The use of the "wedge and sledge" method quite often damages the housing, bearing, and shaft.

Electrical Welding

Various worn and broken parts of the equipment on mine locomotives can be reclaimed with considerable saving of time and money by the use of electric welding. On the other hand, there is a tendency to carry this practice too far by attempting to make repairs on some parts that are likely to break and give trouble in service. Some operators have attempted to build up worn bearing seats on the armature shafts of their mine locomotive motors and after unsuccessful attempts have discontinued this practice. Welding of worn pinion key seats or damaged pinion nut threads on axle-steel shafts has been successfully done. However, there should be no welding of any kind, on shafts made from heat-treated axle or alloy steel, as this practice destroys the treatment of the material and will cause the shafts to fail in service.

Detail Electrical Equipment

It is of the utmost importance to keep the detail electrical equipment in good operating condition, as the failure of any one of these parts will seriously handicap the operation of the locomotive as a unit.

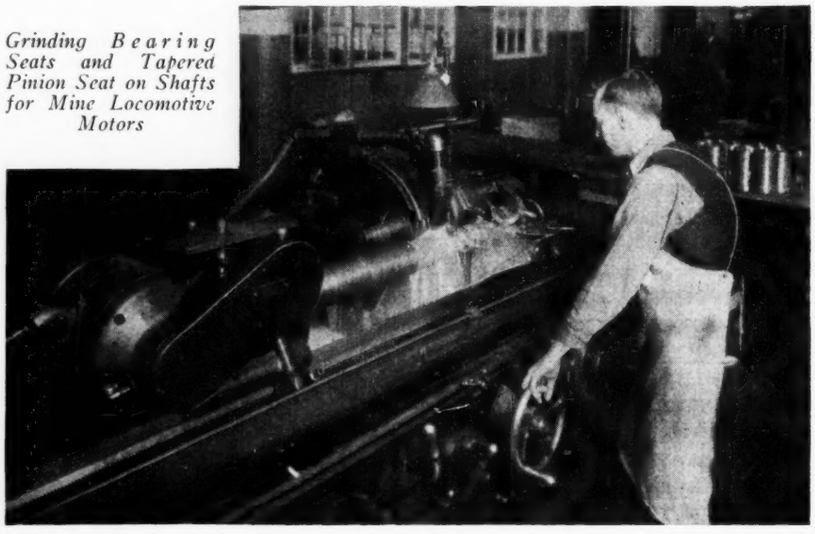
Controllers—Clean the inside of the controller, removing all carbon dust and dirt, then paint with shellac or a special insulating compound. Carefully smooth up all contacts and segments, using a fine file, and then lubricate with a thin film of oil. Average pressures most generally used with the old type of fingers are as follows:

Width of Finger	Pressures
1 in.	8 lb.
¾ in.	6 lb.
½ in.	4 lb.

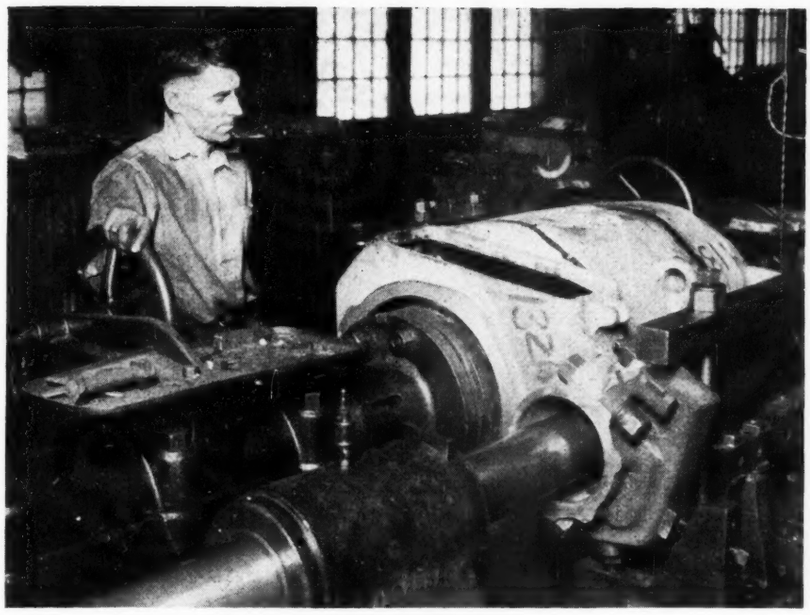
These pressures should be checked by a small spring balance. With the new compensating type finger developed for some of the drum-type controllers the pressure should be maintained at approximately 60 per cent of the above given values. Repaired controllers should be given the same voltage test as that recommended for rewound armatures.

Fuses—The fuses most commonly used are the copper ribbon type mounted in a specially designed box. These standard ribbon fuses are rated at one-half the current at which they will blow in 30 seconds. In applying a fuse select and use one with a continuous current rating at least equal to the continuous duty imposed upon it. Keep the inside of the box clean and be sure that the fuse is securely clamped in place and of the proper size to protect the equipment.

Circuit Breakers — When circuit breakers are used, see that they are overhauled at regular periods and tested for grounds at the same volt-



Grinding Bearing Seats and Tapered Pinion Seat on Shafts for Mine Locomotive Motors



Special Double-Spindle Horizontal Boring Mill Used to Rebore Housing Seats and Axle Bearing Seats in Motor Frames and Axle Caps

age recommended for rewound armatures. See that all contacts are cleaned and filed smoothly and then properly adjusted. Lubricate the tripping mechanism with a little light oil to make it work freely. See that the blowout coils are put in good repair and well insulated. It is advisable to check and adjust the setting of all circuit breakers about every six to eight months using an ammeter.

Lightning Arresters—Locomotives operating above ground should be provided with lightning arresters to protect the equipment during electrical storms. Connections to the arrester and from the arrester to ground should be made as short and straight as possible. Arresters should be inspected regularly, the time of inspection to be based on the type of arresters used. Especially after each storm all arresters should be inspected and put in good working condition.

Resistors — The grid resistors should be kept thoroughly cleaned of all dust and dirt. Tighten up the tierod bolts and lead connections and replace all cracked or broken grids by new ones. Use only grids that are accurately ground at the contact on the bosses, and that have the correct ohmic resistance values. Give all repaired resistors a ground test similar to the test recommended for rewound motors. In this connection these tests should be made from each tierod to the end frames, also from each tierod to the grids. A new type of resistor has been developed and is being used to replace the old cast grids on a number of locomotives. These individual resistors are made from a high-resistance metal ribbon, wound edgewise and mounted on porcelain supports which are supported on a flat steel rod.

Trolley Details—When replacing a trolley wheel always use a new axle pin, or see that the old one is in good working condition. Keep these bearings in good shape, as much wear will tend to cause jumping and pounding of the wheels. The phosphor bronze contacts on the harp should be kept in good shape and make full contact on the side of the wheel. The trolley wheels most commonly used are 4 to 5 in. in diameter made from a bronze alloy containing at least 90 per cent of copper. All wheels should be carefully machined and well balanced to minimize pounding on the overhead trolley wires. Pole socket axle pins and all other moving parts must be kept well lubricated. The tension on the trolley base should be adjusted to get about 15 lb. pressure on the wheel at the trolley wire.

Headlights—All detail parts of the headlights, and of the resistors, when used, must be kept in good repair. When lamp replacements are made, care should be taken to use lamps of the same wattage as the ones being removed. Thoroughly clean the inside of the lamp frame, especially the reflector, and see that all covers are tightly fitted and sealed to properly protect the lamp globe and reflector from dust and dirt.

Gathering Reels — The gathering reels which are used on certain types of locomotives should be carefully inspected and kept in good operating condition. In the motor-driven types, the bearings must be examined and the windings kept clean and occasionally tested for grounds. The insulation on the cable must be examined and all damaged sections repaired or replaced. The insulated cable guide and cable guide mechanism should be kept free from dirt. Lubricate the lead screw in order to reduce wear and tear, and to prevent failure of these parts in service.

Mechanical Parts

It would be useless to keep the electrical equipment in good repair and neglect the upkeep of the mechanical parts. In this connection, recommend that some consideration be given to the following:

Frame and Details—All worn or damaged detail parts of the frame must be repaired or replaced by new ones. On locomotives equipped with leaf springs, apply a small quantity of oil from time to time to the top half and permit it to run down the sides where it will eventually creep in between the individual leaves. Examine the journal box springs at least once a week and replace any which may be cracked or broken.

Wheels and Axles—The wheels, which may be either cast iron with chilled treads, steel tired or solid rolled steel, are pressed on high-grade forged steel axles. The pressure required is about 10 tons to the inch of the diameter of the bore of the axle fit in the wheel, and with these pressures, keys are not required. Cast-iron wheels should be replaced when worn through the chill. All steel wheels should be turned down in a lathe when the tread becomes badly worn. In this connection it is advisable to turn these wheels before they begin to cause damage to the tracks. It will be found that a wheel damages the track at the switches, frogs and curves, at about the same time it reaches its limit of wear and requires turning or replacing with a new one.

Journal Boxes—The journal boxes are made of cast iron and on certain types of locomotives are so constructed that the end thrust of the axle is taken by a brass wearing plate mounted on the inside of the lid. This design, when properly maintained, prevents the wear at the wheel hub. When the thrust plate and journal brasses are worn badly they should be replaced by new parts. Neglect of

(*Turn to page 753*)

Pennsylvania Operators Study Multiple Shifting of Mines

THOSE who attended the all-day conference of the mining section of the Engineers' Society of Western Pennsylvania, held in Pittsburgh on Nov. 26, left with the impression that operators in western Pennsylvania and fringing fields no longer look upon loaders and conveyors with skepticism. Those operators are now concerned only in methods and means of placing these machines on a safer and more profitable basis. Mining layouts, multiple shifting and ventilation were treated, and Dr. L. E. Young, chairman of the section, presided.

"Hand Loading With the Block System in Concentrated Mining" was the title of a paper given by M. D. Cooper, division general superintendent of the Hillman Coal & Coke Co. The advantages of the block system are high recovery and avoidance of trouble from squeezing. It is not as satisfactory as some other systems from the standpoint of lump-coal production, as it requires the driving of many narrow places.

Triple shifting, or continuous operation, of mines was the subject of a paper by H. E. Mason, superintendent, H. C. Frick Coke Co. Multiple shifting has proved to be one of the ways out of a difficult economic situation in operating old mines. He expressed the merits of continuous operation with the words "seconds saved are dollars earned."

In fifteen mines of his company coal is taken during more than one shift; six are triple shifted, four are double shifted and the remaining five are operated in single and double shifts according to the demand on the plants. Where the mines work three shifts, every face is mined continuously six days a week. The eight-hour working time starts and stops at the working place. Each man stays in his place until the arrival of his successor on the succeeding shift. This arrangement is advantageous in that the man retiring can inform the incoming worker as to any change in conditions that might have occurred during the last eight hours.

Triple shifting was started in the Trotter mine of the Frick company in 1923. In this mine little coal remains in a ¾-mile radius of the shaft bottom. Single shift operation of this plant would be impracticable inasmuch as this mine produces 3,250,000 gallons of water every 24 hours and because much timbering is required to keep the working safe. The main motive in triple shifting is to race production with obsolescence, as it would not be profitable to install new machines in an old mine.

IT IS calculated that the operation of Frick mines three shifts each day has resulted in an over-all saving of 30 to 40 per cent as compared with operation during one shift only. The greatest saving is in overhead, which is reduced one-half to two-thirds. One shift foreman is provided for each shift, and the general foreman, who is in complete charge underground, splits his time between the three shifts, which are rotated every two weeks. The assistant foremen act as firebosses and in the latter capacity make runs every day, starting two hours before the men begin work. In the Trotter mine all coal is produced by pick work and the production per miner per shift is about 9 tons, with the miner doing his own timbering. When the shot-firers are not engaged in blasting, they occupy their time with other jobs. The mechanical force on the outside works but one shift. Where coal is mined three shifts, hoisting and dumping is usually conducted on two shifts.

Mr. Mason said the best records of the Frick company in safety have been achieved in the multiple shift mines. The two operations having the best safety record are Trotter and Lemont. Trotter, with 337 men, had no disabling accidents in seventeen months ending December, 1928. Lemont, with an average of 633 men at work per day, during those same seventeen months had eleven disabling accidents, or an accident rate of 1.74 per 100 men employed. The six Frick mines which are triple shifted in 1928 produced 2,781,702 tons of coal without a fatal accident, 154,539 tons per serious accident and 103,026 tons per lost-time accident. The accident rate for all mines of the Frick company in 1928 was 1,251,000 tons per fatal accident, 75,000 per serious accident and 42,000 per lost-time accident.

Multiple shifting is not unaccompanied by some degree of hardship to the men until they grow accustomed to the oddity of changing from an early to a later shift. The last shift is hardest for the men, who say it takes about two days to grow accustomed to the change to this shift. On the whole, the men are well satisfied with this schedule for accelerating production, as substantiated by the extremely small labor turnover at these mines. Inquiry as to the provisions for filling the places of absentees was made by F. C. Reynolds. In reply Mr. Mason said that as the mines worked on a multiple shift are old, much slate has to be handled. The men employed for this purpose are substituted for the absent coal loaders.

IN A PAPER on "Hand Loading in Wing Rooms," Harry M. White, manager of mines, Pittsburgh Coal Co., described a mining system incorporating two-stepped faces in a single room which was adopted several years ago for the recovery of coal under light cover. A room is driven 32-ft. wide, leaving a 5-ft. pillar which is not recovered. The room front consists of two 16-ft. faces which are so stepped that one is 15 ft. in advance of the other, allowing the working of two men in a room and the serving of one mine car to each. In this layout a higher percentage of lump is obtained, most of the larger sizes coming from the outby face; each cutting machine will produce at least 10 tons more per shift; and the two men in a room work in such close proximity of each other that they can work jointly on jobs requiring more than one man.

Jerome C. White, production engineer, Pittsburgh Coal Co., followed with a paper on "The Use of Loading Machines in the Block System." For loading machine operations the block system is advantageous in that it gives extreme flexibility in the retreat.

"Intensive Mining in Great Britain and Germany" was the title of a paper presented by Howard N. Eavenson, consulting engineer, Pittsburgh, Pa. He confined his talk almost exclusively to mining in the Ruhr district of Germany. Where the coal pitches steeply, it is recovered by a combination of rock tunnels and auxiliary underground shafts, in which hoisting is done by compressed-air hoists. The law requires that all voids created by mining be backfilled.

This stowing requires about 25 per cent of all the labor involved in mining. In British and continental mines coal usually is loaded during two shifts per day and so hoisted. The number of machines used in the Ruhr district has increased four to five times from 1916 to 1927 and in the last year mentioned 85 per cent of the tonnage was produced by machinery.

EVERY day cut from the time required to develop a mine to full capacity means money saved. This fact represents one of the big advantages in developing a new mine from the grass roots by loading machines, according to E. J. Weimer, superintendent, Butler Consolidated Coal Co., Butler Pa., who talked on the use of loading machines for development work in the new Wildwood mine, where loading machines are being used for driving entries. This mine was started in December, 1928, and in the first ten months of operation the machines drove 13 miles of entries and crosscuts. The machines are operated two shifts each day and crews are alternated from one shift to another at the beginning of the week. When a mine is developed by machines, the progress is so rapid and the underground picture changes so completely from shift to shift that a mine foreman, when he first enters the mine at the beginning of a shift, is more or less bewildered by the change that has taken place during his 16-hour absence from the mine. This difficulty has been remedied by having the individual foremen each day mark the advance of coal faces and track extensions on maps.

"Face Conveyors in Headings and Room Pillars" was the title of a paper read by L. H. Schnerr, division manager, Pennsylvania division of the Consolidation Coal Co. This paper dealt with the operation of the Gray mine, a 100-per cent conveyor mine located near Somerset, Pa., in the Upper Freeport seam. In the system used one room is completely mined before another is started. A common wage rate is paid to all men on a crew, the exception being the leader, who is compensated at a rate that will enable him to furnish all explosives and small tools. This scheme has avoided troubles otherwise met in keeping tools at the working face. Mr. Schnerr said that in the light of the experience of his company triple shifting is impracticable, because some time must be set aside for inspection and maintenance of equipment and because it is sometimes necessary for a crew to work slightly in excess of the eight-hour period.

A paper on conveyor mining in the Jerome mine of the Hillman Coal & Coke Co. was read by W. L. Affelder, assistant to the president, in the absence of the author, E. A. Siemon, division general superintendent. The mining system followed is the single-room system and it was said that as much coal is obtained from a single room by conveyors as can be had by the customary number of rooms required in hand mining in one panel. Conveyors have reduced haulage costs 60 per cent and have increased the man-shift output 50 per cent.

Glenn B. Southward, mechanization engineer, American Mining Congress, illustrated by lantern slides several layouts for handling and eliminating chain pillars and room stumps. He said the time had arrived to give more thought to the recovery of stumps from the original conveyor step-up. One method suggested is to reach these stumps by driving through from rooms in a panel below the gob.

SCRAPERS of the entry-loader type are being used successfully in the driving of entries in the thin-seam mines of the Clearfield Bituminous Coal Corporation at Indiana, Pa., according to T. F. McCarthy, assistant general superintendent, who read a paper on the subject. A crew of three men with this equipment will advance an entry face three 6-ft. cuts per shift regularly. Between 30 and 40 per cent of the shift time is required for loading. The haulage entry is widened out by slabbing to accommodate the roof rock taken in brushing the roof.

Fred Norman, chief engineer of the Allegheny River Mining Co., Kittanning, Pa., described the use of scrapers in wide rooms. One of the layouts for scraper mining which he described is developed by driving a pair of narrow rooms on each side of a 200 ft. block and by further splitting this block in two parts by an escapeway in the middle. Two 45-deg. angular faces are developed in this block so as to meet in an apex over the escapeway. In this layout a crew of five men will load 100 tons in a shift with one scraper.

With increasing concentration of men and machines in a unit area and with acceleration in the rate of extraction, circumspection in attending ventilation problems grows more urgent, stated J. A. Saxe, chief engineer, Ellsworth Collieries Co., Ellsworth, Pa. Increase in the rate of mining is accompanied by a proportionate increase in the rate at which gas is released from the coal. It is necessary, therefore, to boost the volume of air in the same ratio as is represented by the step-up in the rate of extraction. More elaborate means should be taken to bleed off standing gas in gob areas. Where the gob closes tight, ventilation becomes a problem of grave importance. Mr. Saxe suggested as one method the establishment of bleeders or police airways along the boundary lines, for the removal of such accumulations of gas. Placing more air in a mine does not always mean that the per-ton cost of ventilation will be increased. He cited the case of one mine where the quantity of air was increased 40 per cent with a reduction of 2c. per ton in the cost of ventilation.

Keeping Electric Locomotives Continuously on the Job

(Continued from page 751)

these parts will cause rapid wear and final destruction of the journal boxes.

Brake Rigging—The brake rigging, which is one of the most important parts of the locomotive, should be kept in good working order at all times. All parts should be regularly and systematically inspected and the worn and defective parts put in good condition or replaced by new parts. As safe operation is largely dependent upon good brakes, they should be frequently adjusted and overhauled to insure the proper braking action.

Sanders—The sanders should be kept in good repair and the openings or outlets kept free to insure a quick application of sand when needed to prevent the slipping of the wheels.

To further improve the operation of mine locomotives and to minimize their failures, which means a larger output of coal, some attention should be given to the following:

1. Keep the roadbed for the tracks in good repair.
2. Align and secure all rails to the ties.
3. Special care should be given in bonding all rails at the joints.
4. See that the overhead trolley is properly maintained.
5. Experienced and carefully trained locomotive drivers or operators are essential.

COAL AGE

SYDNEY A. HALE, *Editor*

NEW YORK, DECEMBER, 1929

Mechanization expansion

NOW THAT mechanical loaders and conveyors are accepted as a matter of course where they are used in mining, more intent thought is being given to the yet incompletely solved problem of secondary underground transportation from these machines to sidetracks or main lines. As it is generally felt that the ultimate answer to this operating riddle will not be in terms of mine cars and locomotives, it looks as if the only alternative equipment must be conveyors.

If this be so, it seems probable that before many years lines of semi-portable conveyors for this secondary transportation, up to a length of, say, 2,000 ft., will be a rather common sight. That development will be followed in the biggest producers by the application of conveyors to primary or main-line transportation—as now practiced in the Colonial and Palmer docks installations of the Frick company.

These changes will require heavy investments, but that fact eventually will not be viewed as a serious objection. Resultant economies and safety should more than compensate for this portion of the mine-investment load. The experiences of the Frick company practically guarantee this outcome.

Stripping vs. shallow mines

A SMALL PERCENTAGE of the public has been critical of the large strippings which are found in various parts of the country. They find that they are, when first made, somewhat unsightly and that in places they interfere with the maintenance and construction of roads. If the coal is not to be removed by stripping, then it must be either left or extracted by shallow mines. It is not likely that the public is desirous of having it left in the ground, so it is clear that the verdict, if not given in favor of stripping, must be awarded to mining under light cover.

Such mining usually is unduly dangerous, for the roof has insufficient strength. It is obvious that in all cases the solid rock stratum, if present, must be thin and that the surface wash or rotten rock must comprise too large a proportion of the cover. Both the rock and coal are likely to have water cutters. In most cases the recovery is extremely low—rarely over 50 per cent—even in sections of the country where the coal usually is extracted with relatively little loss. As a result such mines produce a large quantity of sulphur water, the aeration of the coal causing the pyrite to change to acid rapidly. Another objection to the shallow mine is that it caves, converting the surface into a series of small pits, disastrous alike to farms and roads.

But this is not all. Shallow mines are the worst fire menaces of all underground workings. A deep mine fire usually can be fought successfully, but a shallow fire can rarely be extinguished. It is said that in northeastern Wyoming a room is seldom driven up under shallow cover than it ignites spontaneously and, of course, fires of this kind cannot be controlled. In the West a large proportion, indeed in places one-half of the shallow coal, has during the ages been reduced to ash. On the other hand in a stripping from 90 to 95 per cent of the entire coal is removed and fire in such a working is unlikely; it is perhaps too early to say impossible. The coal left is not only small in quantity but so completely buried with broken material that less acid water would be formed by a stripping than by a shallow mine.

Thus where stripping is practiced, life and coal are saved, the sulphur water is decreased if not eliminated and inextinguishable fires made less likely if not impossible. For these reasons the strip pit is rather a benediction than a curse. In a flat land unsuited to farming, a stripping breaking the unsightliness of the plain and covered with trees may be an oasis in what otherwise would be virtually a desert.

Again, we'll muddle through

THANKSGIVING DAY has come and gone, in places cold and blustery with snow flurries. The winter closes in upon us. Streets and sidewalks become cluttered with snow. How many years will the public be satisfied to rest content to endure that condition in the congested streets when a little heat properly disposed would melt the snow and carry it to the sewers?

Every year the condition becomes more unbearable. Space occupied by automobiles in sunnier weather becomes a repository for mountains of snow preventing hosts of people from coming to town to do their purchasing. Trucking and streetcar service are delayed. Trucks are strained and stalled or their loads decreased. Longer hours or more units are necessary, with accompanying increase in cost. Fire hazards are increased.

All these losses could be avoided. Employees could arrive at their benches and desks in better time; Christmas shopping could be done promptly and without exasperation; services could be maintained at uniform cost and with greater regularity; fires could be more promptly subdued if the sidewalks and streets were warmed by steam pipes, at least in the central ganglia of our big cities.

Why does no one advocate this reform? And lacking advocates why should not those in the coal

industry take the lead? Is the coal man content to leave the idea to propagate itself? Other industries do not wait so patiently on chance but take their fates in hand. Meantime, we shall muddle through. We always do—but at what discomfort and loss!

Too many cooks

TOO MUCH MUDDLING by too many meddlers easily can disturb the balance of a nicely worked out operating plan. Slight modifications and additions to a once completed program may not exert much unfavorable influence; but if many changes are made, incorporating the ideas of this man and that, through the whole gamut of the organization, serious indeed may be the consequences. The ideas may be good individually and yet be incongruous when combined. They cannot merely be thrown together; rather they must be fitted with the patience and skill displayed in matching up, let us say, the pieces of an intricate jigsaw puzzle.

Herein lies a grave danger in the determination of a new mining layout for utilization of conveyors or loaders, pointed out by S. W. Blakslee, general manager of the Pennsylvania Coal & Coke Corporation. During the formative stages of the mechanization program now in force at the Ehrenfeld mine of that organization, Mr. Blakslee restrained himself from offering many of the constructive suggestions that came to his mind, for fear of complicating the original plan. Likewise, he restrained others. His first aim was to develop a practicable system, without frilled detail.

That has been accomplished. And now the management under his guidance is adapting and applying by slow degrees, one after another, the ideas heretofore suggested to fill out and reinforce the main body of the mechanization structure. His mode of attack is fundamental to mechanization.

Bagging coal

BAGGING COAL at the retail yard prior to delivery of the fuel to the domestic consumer is not new. Under exceptional conditions, shipments in bags also have been made from the mines. But the realization of the imperative need for improvement in coal merchandising processes has greatly intensified interest in the question of packaging fuel. Recent months have witnessed increased experimentation; bags of various materials, and even large cartons, have been tried out.

For the most part, however, these experiments have been individual. A broader effort to popularize bagged-coal delivery has been undertaken by the Cotton-Textile Institute working with F. M. Feiker, managing director of the Associated Business Papers. Essentially the plan is a modification of the common method of delivery where the consumer's cellar and bins are so located that chute delivery from the wagon or truck is not feasible. For years in such cases the retailer has carried in the coal in bags and dumped the fuel. Under the new plan, the coal is left in the bags and the empty containers are reclaimed on the next delivery.

That the plan is an improvement is obvious. But the bigger possibility—that of packaging in trademarked and sealed containers at the mines—is still untouched. With the growing market for smaller sizes to be used in magazine and stoker-feed domestic heating plants, the field for such packaging is appealing. Cleaner delivery, guaranteed quality and establishment of greater consumer confidence in the product of the industry are among the patent advantages. The difficulties in adopting the plan have yet to be proved insuperable—unless, of course, the industry is ready to admit that its merchandising ideas have not outgrown the era of the soda-cracker barrel. And to such an admission *Coal Age* declines to subscribe.

Find the horseshoe nail

IN CHILDHOOD DAYS the startling effects that may arise from trivial causes was impressed upon many a juvenile mind by a bit of verse which recited how a kingdom was lost "for the want of a horseshoe nail." Refusal to accept the proximate cause as the true explanation until investigation has determined just where the chain of events which produced a certain result really began might well be adopted more generally in the mining industry. Such refusal seems particularly appropriate in safety work, where too ready acceptance of accidents as unavoidable encourages repetition.

The value of such refusal was sharply outlined in the address of D. D. Wilcox, general superintendent, Superior Coal Co., at the Eighteenth Annual Safety Congress in Chicago. A trip rider in one of his company's mines, he explained, was injured by a fall of slate. The immediate cause of the fall was the knocking out of a prop by a car which jumped the track. But the car jumped the track because the wheels were in bad condition and the condition of the wheels was the result of neglect in lubrication. Had the management been satisfied with the immediate cause of the accident as the basic one the real cause would have remained unknown and the chances for a repetition of that particular type of accident would have been undiminished.

"The deceased came to his death through causes unknown"—that cliche of the superficial investigation—may fulfill the requirements of the coroner's jury and appease public curiosity. But contentment with such an easy way out will never contribute to accident prevention. Only a determination to track down the real cause will accomplish that. The object lesson fails unless we find the horseshoe nail.

The BOSSES

Multiple Shifting In Mechanized Mining

MAC breezed into Jim's office at the end of the shift with an airy grin on his face. "Those three loading machines in the Flats have been going great guns lately, Jim. Know what they did today? Each averaged 325 tons."

"That's great," answered the Super. "The Old Man is as tickled over the results as we are; so much so that now he is talking about double-shifting the machine. That means we'll have to get busy and lay out time and operation schedules and decide how many places should be made available for each machine."

"That's easy, Jim. All we will have to do is to start another crew at four in the afternoon, and provide a few more working places."

"No, Mac, that's the old way of doing things. First of all, I don't think more than one extra place should be allocated to each machine. As for the job of splitting the men into crews, you can't merely solve the problem by starting two loading shifts. The problem is more involved than that and will require a precise scheduling and co-ordinating of all divisions of the job. My idea is to follow the plan adopted by some industrial plants outside the coal industry, which start the men to work at the times when they are logically needed. Instead of having two or three eight-hour shifts, I would have four or six and start them at intervals of four hours. Each crew would be composed of those men whose jobs would fit best into the respective shifts. That plan would give better co-ordination of jobs, exact more efficiency from the force and eliminate delay and gaps in operation."

"I am afraid that scheme would be too complicated, Jim."

WHAT IS YOUR OPINION?

(1) How would you schedule jobs in multiple shifting?

(2) Would it be advisable to make the crews smaller and start them, say, every four hours?

(3) Should one foreman be made responsible for underground operation throughout the 24 hours?

(4) Is Jim's plan practicable—why or why not?

All superintendents, foremen, electrical and mechanical men are urged

Talk It Over

What Jobs Can Be Handled by Workers Individually?

Time Studies Will Uncover Inefficiencies in Mining

JIM is certainly right in his statement that the efficiency of loaders (hand or mechanical) is bettered at the expense of rising cost and lowered efficiency of day labor. Our mine is operating on a mechanical basis and double-shifting is the practice, which means that day labor is scattered over the 24 hours of the day as well as over every section of the mine. To meet the problems that arise from this situation, the following procedures have been established:

Each day laborer makes out a daily report indicating the job he works on, its location and the time of completion. This has been in effect for some time and has proved quite beneficial. It has helped the bookkeeping department in the compilation of costs and has furnished an abundance of information that is useful in carrying out the remainder of our program.

All day labor has been placed on one shift and is under the direct supervision of an assistant mine foreman. By this arrangement we hope to accomplish the following results: (1) Requisitions for all day work will be made out by the several section foremen and handed to the day labor foreman for execution. (2) The labor foreman will keep his men on the same kind of work every day as far as possible and in this way increase their efficiency. (3) The management will be in a position to foretell separately the cost of maintenance work and the cost of day labor.

Time studies are being taken on every job possible. These exact job analyses should be most fruitful. They embrace not only the time for doing a piece of work, but also go into the matter of the number of men necessary for doing it efficiently and decide what tools are required. Some of the jobs on which time studies have been made are laying and maintaining track, retrieving timbers, timbering, cleaning up falls and building brattices. Some will say that it is impossible to study this type of work by a stop-watch. Manufacturing plants are placing their day-labor maintenance departments on incentive systems, the foundation of which is time study analysis. Even if the day labor is not placed on an incentive plan, the analysis will uncover a great many inefficiencies and it will help the supervisors and impart to them knowledge of the average time required to do a job.

Some time ago the writer asked a group of foremen how long it should take to complete a certain job and the estimates given varied from 1½ to 8 hours. By actual time study the time for that job was 3 hours. From this, one can see how and why the stop-watch will prove helpful.

Should day labor be put on some incentive basis? The question of creating an incentive for the various jobs is one that must be given careful consideration, for in the answer lies the success of the whole system. The incentive first must be fair and, second, have a positive method of control. There are many types of incentives, but the one best suited for this kind of work is a day base, piece-work rate, in which labor is paid so much per hour plus so much per unit. This schedule safeguards the laborer for he will make his minimum wage regardless of what might occur during the work shift. The company benefits in that the more the men earn, the less the labor cost will be.

It must be admitted that the above procedure for lowering day labor cost requires a lot of effort and may involve some red tape in comparison with present methods, but the results will justify the means. The coal-mining industry might accomplish a great deal by applying some of the methods that are used in manufacturing industries. Facts, not opinions, are what count nowadays. Opinions in themselves never pay dividends.

A. J. RUFFINI.

Cadiz, Ohio.

Planning is the Thing

EFFICIENCY GETTING requires a deep insight into human nature and constant study of individual working men. There are workers who need continual prodding and still others who should be left alone to get the most out of them. In ordinary jobs of track laying or mucking one man will accomplish more in a shift when working alone and with less fatigue than if he works with another man, providing the job has been planned and all the necessary materials made available for immediate use. Much of the time lost in a coal mine results from a lack of system.

I know that some men will suggest as a solution to this problem the shifting of men from job to job during a working period. That may help some, but it will not eliminate inefficiency, because too much time will be lost in chasing the men from one section of a mine to another. The only sensible solution is to plan in advance. The one big danger in thus tightening the reins of management is the tendency of officials to become hard-boiled toward their men. Unless the brakes are applied to the movement in this direction, what benefits are derived from strict management will be lost by reason of the ill-feeling created between officials and men. Better management methods in themselves will not entirely solve the problem.

J. A. R.

Sullivan, Ind.

It Can Be Done—Sometimes

IN ANSWER to Jim's statement that out in the West there is a mine where the track layers work without helpers I merely say that this company must have ideal mining conditions and that bottom rolls are a rarity. Much depends on whether light or heavy rails are used and on whether a "devil" must be employed to hold the tie tight to the rail. However, the customary number of men on a crew in many instances can be reduced.

Much of the timbering work can be done by a one-man crew; the brattice

to discuss these questions. Acceptable letters will be paid for

Management—Forward!

Top executives should encourage their operating officials to read and to contribute to these pages. Here will be found matters that burrow deep into management. Here also will be found original ideas and suggestions that may be the roots of improvements that may grow to tree-like proportions. In this issue alone the department carries suggestions comparatively new to coal mining. Thus a plea for "scientific-management" methods is made. It is advocated that day laborers fill out a daily work report. Contributors generally agree that many of the jobs now done by two men could be handled by one man. Planning will avoid much lost time and wasted effort. More efficiency can be obtained by overlapping shifts for certain jobs. Revolutionary ideas, yes—some of them—but they are suggested by practical men.

man can work alone; where rock-dusting is the practice, the helper can be of assistance to the track layer at odd times and a portion of the time of road cleaners can be utilized in the same way.

Probably the weakest link in the chain of mine management develops from attempts of plant officials to direct operations from the office. Workingmen are bound to be impressed by the easy-going habits of officials and to follow their example. It is up to Jim and his superiors to visit the underground workings frequently to make sure the foremen and the men themselves are not abusing the confidence of the company in the conduct of their work.

Scranton, Pa. FREDERICK NEUMAN.

Too Much Conversation And Not Enough Work

UNLESS the members of a two-man crew can be kept so busy that they find little time for conversation, their combined accomplishment may not be equivalent to the conscientious effort of only one man. Much track and timbering work can be done by a one-man crew. It is a good plan to so line up and assign the work that the men, though working individually, are kept in such close proximity to each other that they can be of mutual assistance when necessary. Another way to handle the situation is to assign a fill-in job to a few extra men who can be called upon as helpers only when absolutely needed. These extra men might be kept busy at odd moments in tightening track bolts, cleaning out refuse and in doing other similar jobs.

Stickney, W. Va. F. J. HALL.

One-Man Crew Is Inadvisable

YOU can't increase efficiency and decrease costs by cutting down many of the crews to one man, as in much of the work the man will do only about 25 per cent as much as two men. If the territory is too small for the employment of two track men, arrange to let them do other work to occupy their time when they are not laying track. There is bad roof to be handled or timbered, a stopping to be built and perhaps track material to be reclaimed. When you cut down on your track work you go up on your costs.

I do not understand Jim in saying that the institution of the daily clean-up system had caused more men to be added to the payroll. If, for instance, he had put on more track crews to lay places up that had not been finished at quitting time, his mistake was in commission. What he should have done was to transfer a few of the track crews from the day shift to the night shift. To take care of late clean-ups, we start the track crews at noon and consequently no extra crews or overtime are required. WALTER HORNSBY.

Stickney, W. Va.

Only One Man Is Needed For Laying Light Track

CO-ORDINATION of day labor should rest entirely on the shoulders of each section foreman. In laying switches and rails up to a weight of 30 lb., track men should work singly, but above this weight it is more economical to work a crew of two or more men, according to the weight of the material to be handled. Pipe-line and timber crews for ordinary purposes should consist of two men. However, you can't set a hard and fast rule as to the number of men required for a particular crew, as that must depend entirely on the nature of the job.

All men working on track, pipe and timbering should own individual sets of tools so that they can work alone whenever necessary. As the tools required for track work are heavy and cumbersome, they should be kept in a box, equipped with a lock, on a light truck to facilitate transportation. A section foreman should know at all times what jobs ought to be done and how long it should take to complete them. Upon entering the mine at the beginning of the shift he should set his daily schedule and in assigning jobs should let the day men know what is expected of them in the ensuing shift.

A. L. HUNT, Superintendent, Pennsylvania Coal & Coke Corporation
Cresson, Pa.

Publications Received

Efficiency, Cost, and Safety of Storage-Battery Equipment in Bituminous Coal Mines, and Some Comparisons with Wired Transmission of Power, by C. W. Owings and D. C. Jones. Mining and Metallurgical Investigations under the auspices of U. S. Bureau of Mines, Carnegie Institute of Technology and Mining and Metallurgical Advisory Boards. Co-operative Bulletin 42; 263 pp., illustrated. Price, $2.

An Investigation of the Friability of Different Coals, by Cloyde M. Smith. Engineering Experiment Station, University of Illinois, Urbana, Ill. Bulletin No. 196; 50 pp., illustrated. Price, 30c. Covers the results of several hundred individual tests on the breakage of coal.

A Study of Fatigue Cracks in Car Axles, by H. F. Moore, Stuart W. Lyon and N. J. Alleman. Part II. Engineering Experiment Station, University of Illinois, Urbana, Ill. Bulletin 197; 30 pp., illustrated. Price, 20c.

Fundamentals of Our Coal Problem, Including Salient Features of the U. S. Coal Commission's Report, by Samuel S. Wyer. Fuel-Power-Transportation Educational Foundation, Columbus, Ohio. Pp. 40, illustrated.

Mine Explosions in the United States During the Fiscal Year Ended June 30, 1929, by D. Harrington and C. W. Owings. Bureau of Mines, Washington, D. C. Circular 6178; 15 pp.

Accident Reduction in Alabama Coal Mines, by F. E. Cash. Bureau of Mines, Washington, D. C. Circular 6191; 9 pp.

Report of an Investigation at the Mines Department Testing Station, Sheffield, of the Safety of Miners' Electric Cap Lamps When the Battery Is Short-Circuited, by Capt. C. B. Platt. H. M. Stationery Office, Adastral House, Kingsway, W.C.2, London, England. Price, 2d. net. Pp. 7; illustrated.

Coke and By-Products in 1927, by F. G. Tryon and H. L. Bennit. Bureau of Mines, Washington, D. C. (Mineral Resources of the U. S., 1927—Part II, pp. 595-687). Price, 15c. Pp. 93; charts and tables.

Let the Worker Suggest

IT IS quite necessary that the foreman impress on the minds of his workers that he is always open to suggestions from his men on matters of operation, maintenance and safety. No foreman should think that a worker is trying to run his business when the man makes a suggestion for improvement or when he passes on to the boss a bit of information that is vital to better operation. The importance of all men's responsibility, collectively and individually, regardless of the importance of their job, as an influence in better management, should not be overlooked. The working man should be as much concerned as to whether the boss is doing his job well as the boss is regarding the working conduct of the man.

Pruden, Tenn. CAL DIXON.

Let a Miner Act as Helper

I SEE no reason why a miner should not be called upon to act as a helper to a track man working at the faces. Under ordinary circumstances, while the track man is in a miner's place, the latter is idle and may be tempted to go home, so why not ask him to help lay the track in his place? In all probability he will be more efficient than the man who might otherwise be selected as the helper and certainly he will insist upon a good job being done. Furthermore, he will not tolerate any waste of time, as he will be anxious to get back to his regular job. During stretches of three or four days at a time the track man has no need for a helper and that need, when it does occur, lasts for not more than one or two hours at a time.

The number of men can be reduced on many of the labor crews in the majority of mines. Many of the men need not be assigned exclusively to one job. In our mine the men on the labor gang are shifted from job to job as their services are needed. This applies to such jobs as the cleaning up of falls or of roads, the taking of slate and much of the timbering. When an emergency job must be done, we frequently enlist the services of a miner to do it and he has come to understand this arrangement as necessary for his continued prosperity through steady working of the mine.

Machine bosses and electricians should not have a helper. When they are called upon to repair a cutting machine or a locomotive, the machine runner or the motorman should be called

upon to help them. In the first place, in the case of a breakdown, these men are idle; furthermore, the experience gained by them in helping the regular repair men will give them a better knowledge of their machine and impress upon them the necessity for taking better care of it. Often the hours of pumping can be rearranged and the number of men on the pumping crews thereby reduced. The boss driver is a job that is more or less superficial, as under correct handling by the section foremen, the drivers and motormen will give satisfactory results in the absence of boss drivers.

Manor, Pa. WILLIAM HAND.

Shift the Men About

IN EARLIER DAYS crews of day men frequently stopped working 40 minutes before the end of a shift. They would collect their tools, fill their pipes, sit down and talk a while and then go outside. There they would meet a smiling foreman who in perfunctory terms asked them how they got along that day. Of course, they worked mighty hard and were tired out. That situation took many dollars from the pocketbook of the company.

Fortunately for the industry, such practices are rapidly disappearing. In the past we had many good mine foremen, but a goodly number who were incapable. Today a man must produce to hold down a job. Blame management first and the working man second for inefficiencies. T. M. JONES.

Valley Creek, Tenn.

Safety Is Mental; Not Physical

WHEN a coal company lays down regulations for keeping things in order and insists on obedience to recognized safe practices, the foundation of safety is well laid. But it takes men, good men, to make the safety program a success. Probably the greatest accident hazard in a mine is the setting up of the rate of doing work without making provisions to take care of the new pace. A good beginning in safety is to clean up and to arrange the operations so that the speed can be increased without endangering lives. To pay a miner for anything so necessary to life as first-aid training should not even be considered. GEORGE EDWARDS.

Paintsville, Ky.

Are Trip Riders Necessary?

ONE MAN can handle the job of laying track at the working place if rails of a weight no greater than 20 lb. are used. We use only one track layer for every 25 to 30 loaders and have found that he is able to keep up this amount of track satisfactorily. The wages paid to a track helper at the face is that much money thrown away. Not only is he idle much of the time, but he is responsible for much idleness on the part of the track layer himself.

In many cases the employment of a trip rider on a main-line locomotive is useless or at best of little value. About the only time he is seen doing useful work is when he couples up a trip, and as this job is accomplished usually at a side track where some other man is generally in attendance, this trip-rider duty could well be eliminated. It will be said that a trip rider functions in the event a trip is derailed. When many cars get off the track, one man is of little value in getting them back on the steel again. More effort should be extended to cutting down the frequency of derailments and permanent track rerailers should be installed. Some of the day men should be assigned to more than one duty. One of the greatest weaknesses in mine management is in too fine a division of labor.

Eldorado, Ill. R. A. BARTLETT.

Men Trained in First Aid Should Be Given Preference

MEN who have received a certificate for first-aid training should always get the preference when a better job is assigned. This scheme will encourage participation in first-aid training. W. E. WARNER.

Brighton, England.

One Man for Timbering Where the Coal Is Low

JIM deserves credit for thinking along the right track in this case. Certainly there are a number of jobs on which the force can be reduced with improved results. It has been the writer's observation that two men working together on track seldom do twice the work that one man can do alone. Of course, in laying heavy steel it is necessary usually to work the men in pairs, but in the laying of rails weighing 30 lb. or less on small ties, two one-man crews will do more work than one two-man crew. The accusation is well founded that the track layer's helper is too frequently paid for sitting on the "rod" and telling funny stories while his buddy is driving spikes.

Timbering is another job which may frequently be done with a reduced force. especially where the coal is low. In high coal, where large sets are required, one man cannot do the work alone. If a job requires two or more men, care should be exercised in making up the crew to see that at least one man is conscientious and has good judgment. He should be assigned and trained as a leader and encouraged with the incentive of being trained for a foreman's job. Under the guidance of the right sort of leader, each member of the crew will be kept busy, and satisfactory results will be obtained.

Central City, Ky. C. H. FARMER.

Recent Patents

Method and Apparatus for Separating Materials of Different Specific Gravities; 1,730,123. H. M. Chance, Philadelphia, Pa. Oct. 1, 1929. Filed Dec. 5, 1925; serial No. 73,420.

Apparatus for Separating Materials of Different Specific Gravities; 1,730,189. H. M. Chance, Philadelphia, Pa. Oct. 1, 1929. Original application filed Dec. 5, 1925; serial No. 73,420. Divided and this application filed April 15, 1929.

Apparatus for Extracting Values From Coal; 1,730,569. Frank C. Greene, Denver, Colo., and Irving F. Laucks, Seattle, Wash., assignors to Old Ben Coal Corporation, Chicago, Ill. Oct. 8, 1929. Filed July 5, 1919; serial No. 308,774.

Pusher Ram for Coke Ovens; 1,730,604. Carroll B. Collins and James A. B. Loveit, Pittsburgh, Pa., assignors to Koppers Co., Pittsburgh, Pa. Oct. 8, 1929. Filed Jan. 29, 1927; serial No. 164,394.

Coal-Cutting Machine; 1,730,755. Christie Black, Dudley, England, assignor to M. S. Moore, Brussels, Belgium. Oct. 8. Filed May 19, 1928; serial No. 279,119.

Fuel Storage Reclaiming System; 1,730,884. W. A. Gilchrist, New York City. Oct. 8, 1929. Filed April 13, 1922; serial No. 552,402.

Pneumatic Separation Table; 1,730,947. George Raw, New Washington, England. Oct. 8, 1929. Filed May 14, 1928; serial No. 277,771.

Mine Ventilating Apparatus; 1,727,669. William N. Perryman, Marion, Ky. Sept. 10, 1929. Filed April 6, 1928; serial No. 267,864.

Mine-Car Puller; 1,727,678. John W. Stedelin and George Klein, Centralia, Ill. Sept. 10, 1929. Filed Nov. 1, 1928; serial No. 316,594.

Mine Car; 1,727,673. Clancy M. Rogers, Belleville, Ill., assignor to American Car & Foundry Co., New York City. Sept. 10, 1929. Filed Dec. 13, 1928; serial No. 325,706.

Mine Car; 1,727,689. Leopold Almquist, Jersey City, N. J. assignor to American Car & Foundry Co., New York City. Sept. 10, 1929. Filed Oct. 5, 1928; serial No. 310,657.

Clamshell Bucket; 1,727,825. Edward L. Harrington, Erie, Pa., assignor to G. H. Williams Co., Erie, Pa. Sept. 10, 1929. Filed Oct. 29, 1926; serial No. 144,959.

Coal-Breaking Machine; 1,728,075. Bertram Norton, Claverley, England. Sept. 10, 1929. Filed Oct. 15, 1927; serial No. 226,465.

Coal Jig; 1,728,196. Francis H. Blatch, Hazleton, Pa., assignor to Wilmot Engineering Co., Hazleton, Pa. Sept. 17, 1929. Filed Feb. 7, 1925; serial No. 7,463.

Coal Conveying and Discharging Device; 1,728,229. William B. Coffman, Norwood, Ohio. Sept. 17, 1929. Filed March 11, 1926; serial No. 93,929.

Automatic Stop for Belt Conveyers; 1,728,283. Charles R. Fisher, Rogers City, Mich. Sept. 17, 1929. Filed Feb. 14, 1927; serial No. 168,152.

Fuel Pulverizer; 1,728,423. Henry G. Lykken, Minneapolis, Minn. Sept. 17, 1929. Filed June 12, 1924; serial No. 79,468.

Coal or Rock-Cutting Machine; 1,728,914. F. J. B. Berry, Lille, France. Sept. 24, 1929. Filed Jan. 14, 1926; serial No. 81,300.

Apparatus for Pulverizing Coal; 1,728,976. H. M. Nobis, East Cleveland, Ohio. Sept. 24, 1929. Filed Oct. 3, 1927; serial No. 223,569.

Mine Car; 1,729,113. John H. Linhardt, St. Francois, Mo., assignor to National Lead Co., New York City. Sept. 24, 1929. Filed March 17, 1927; serial No. 176,203.

Washing Apparatus for Separating Coal and Like Materials; 1,729,545. Charles Marchant, Montigny-le-Tilleul, Belgium. Sept. 24, 1929. Filed Dec. 7, 1926; serial No. 153,157.

Closing Mechanism for Mine Doors; 1,729,719. Albert J. Gurney, Canton, Ohio, assignor to American Mine Door Co., Canton, Ohio. Oct. 1, 1929. Original application filed May 13, 1925; serial No. 30,078. Divided and this application filed Jan. 20, 1927.

Mining Apparatus; 1,729,798. Charles F. Osgood, Claremont, N. H., assignor to Sullivan Machinery Co., Chicago. Oct. 1, 1929.

NOTES

From Across the Sea

MANY YEARS AGO it was ascertained that a mine pillar had to be larger than the surface area it was expected to protect, that, in other words, there occurred a stress, a strain and even breakage over the edge of the pillar. This was technically termed a "draw."

Everyone is beginning to concede at last that this action can and does occur frequently, and, without wasting time to argue the question with all and sundry, a few mining men are diligently measuring the angle of draw and correlating it to depth. The true quantitative theory of draw seems difficult of ascertainment. Even the major principles appear to be matters of reasonable debate. But, at least, we should be able to determine by actual measurement just what is the angle of draw with any given set of conditions. That angle is of importance as determining the distance by which the fracture on the surface extends beyond the pillar line and not, of course, necessarily as representing an actual line of fracture extending from the top edge of the coal pillar to the surface.

T. A. O'Donahue, recently gave his conclusions on this subject to the South Staffordshire and Warwickshire Institution of Mining Engineers, at Birmingham, England. He would make the angle of draw of a level seam 8 deg. or 1 in 7. Thus where the level seam is 1,000 ft. deep, the break, should it occur, would be one-seventh of 1,000 ft. or 143 ft. in advance of the line of face. If, however, the seam is inclined, the angle of draw on the low side of the excavation, according to the same authority, would be 8 deg. plus two-thirds the angle of inclination; that is, supposing the seam is 1,000 ft. deep and dips at an angle of 9 deg., the angle of draw would be 8 plus 6 or 14 deg.

At first Mr. O'Donahue believed that the limiting angle of inclination beyond which the angle of draw did not increase was 24 deg. for which inclination the angle of draw as determined by his formula would be 8 plus 16 or precisely 24 deg. That is the angle of draw would be equal to the angle of inclination and would be at right angles to the inclination of the bed being mined.

Mr. O'Donahue's observations have been limited to seams pitching 45 deg. or less. Recent measurements made where the inclinations ran up to 80 deg. show that a maximum angle of draw of 37 deg. may be attained. Mr. O'Donahue would offer the following tentative rule for seams inclined over 45 deg.: Add three-tenths of the inclination in degrees to 16 to obtain the angle of draw on the pitch side of an excavation.

To the rise side of the extracted seam the angle is 8 deg. minus one-third of the inclination. Thus with the same seam 1,000 ft. deep and pitching at 9 deg. the angle of draw will be 8-3 or 5 deg. as against 14 deg. on the opposite side.

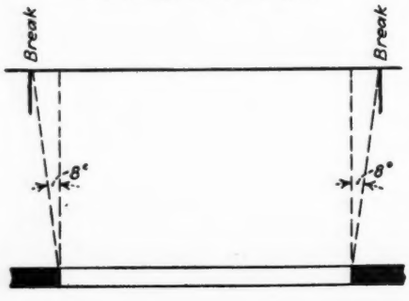
According to Mr. O'Donahue, these figures must be used with a margin of safety running from one-twentieth to one-tenth of the depth of the seam, and revision must be made to accord with the seam hardness. Where the strata are hard, Mr. O'Donahue declares that his constant 8 might be reduced to 6 and where soft increased to 10. He would also advocate increasing the angle of draw for coal thickness. If the coal is over 6 ft. thick he would divide the thickness in feet by 6 and take the square root of the result. The figure thus obtained he would use as a multiplier of the figures obtained otherwise.

He takes issue with Prof. Henry Briggs, Heriot-Watt College, Edinburgh, Scotland, in his recent book on subsidence to the effect that the angle of draw should be 18 deg. for all degrees of dip up to 18 deg. and along a right-angle line for all steeper inclinations.

Like its earlier annual publications the seventh report issued by the British Safety in Mines Research Board contains many valuable contributions to mining science. It declares that "Laboratory investigations have shown that the individual particles of a cloud of coal dust become charged electrically, and that if such a cloud comes in contact with an insulated metal conductor a high charge can be built up on that conductor so that a spark is produced when another conductor is brought sufficiently near.

"In recent experiments on a large scale at Buxton (England) coal dust was allowed to enter the intake side of a small ventilating fan which discharged air into a metal pipe, 1 ft. in diameter and 12 ft. long, insulated from earth. In dry weather, with a dense dust cloud, a high charge was gathered by the air pipe and sparks could be drawn from it which ignited firedamp. The limiting conditions, as regards the density of the dust cloud and the velocity of the air current have not yet been determined."

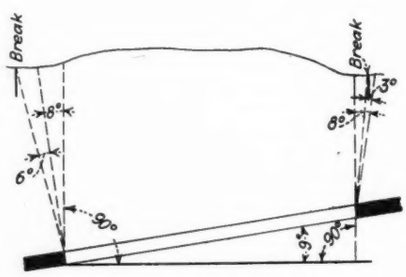
Angle of Draw With Level Seam According to O'Donahue



A new danger has been discovered by Prof. H. B. Dixon who has been making experiments on the ignition of firedamp for the Safety in Mines Research Board at Manchester University. He has ascertained that with quite small traces of nitrogen peroxide the ignition temperature of methane is considerably lowered. For example, in comparative experiments that temperature was reduced from 730 deg. C. to 630 deg. C. by the presence of as little as 0.1 per cent of nitrogen peroxide.

"The importance of this discovery" says the report, "with respect to the ignition of firedamp by explosives is evident, for many explosives, on detonation, yield traces of oxides of nitrogen. The hot gaseous products of some types of explosives may be therefore more potent to ignite firedamp than has hitherto been suspected."

Not less interesting is the discovery that coal which has been heated to a certain temperature is more subject to oxidation than coal that has not been heated. This fact may assist in explaining the ease with which a slight inleakage of air ignites the coal in an area that has been sealed to extinguish a gob fire.



Angle of Draw With Dipping Seam, Same Authority

The report declares that the temperature at which this active-decomposition point occurs varies with the carbon content of the coal and ranges from 290 deg. C. for a coal containing 77 per cent of carbon to 365 deg. C for one containing 90 per cent.

"The residue remaining after the active-decomposition point has been passed, but not much exceeded, is, with some coals, more reactive (after cooling) than the original coal, absorbing oxygen more rapidly. On heating the coal much above the active-decomposition point, this enhanced re-activity disappears. It can be understood that when a large mass of coal becomes heated during an underground fire, some portion of it remains at or near the active-decomposition point, so that the residue, after cooling, may be liable to spontaneous combustion—more liable than the original coal."

The same research bureau has been making investigations as to mine posts.

in Great Britain a number of steel-tube props with solid wood cores have been used and a study has been made as to the possibility of straightening these props after they have buckled. It has been found that if the buckling is not allowed to develop so far that it causes serious local crippling of the prop, the strength after straightening cold is as great as when the prop is new.

Experiments were made on Norway props 6 ft. long. On being immersed in water the quantity of moisture in the props increased from 12 to 40 per cent and the length augmented 0.0376 in. After drying for 90 days the moisture fell to 13.8 per cent and the shrinkage was 0.0376 in. bringing the props back to their original length.

After this, drying and shrinkage continued, but although the moisture content finally reached its practically constant value of 10 per cent, the shrinking continued at a practically constant rate and showed no signs of ceasing even after 380 days of drying. At this point the total shortening was 0.0956 in. which is equal to the strain produced by a stress of 1,920 lb. per square inch. So a prop set in a saturated condition with an initial stress of 1,920 lb. per square inch would not become loose by shrinkage until after 380 days of drying. However, temperatures and moisture conditions other than those obtaining on the surface exist underground. Moreover, it is assumed in this statement without sufficient data to substantiate it that the shrinkage of stressed and unstressed timber is the same. The bureau through Prof. Dixon will investigate this matter further.

Experiments have shown that timber stacked in the open cannot be dried down to less than 20 per cent moisture and that in winter the moisture content of props in the body of the timber stack may be as much as 35 per cent. The fiber saturation point of prop timber is about 27 per cent, so that props stacked in the open are in effect wet props with strengths from one-half to two-thirds that of room-dry props.

R Dawson Hall

On the ENGINEER'S BOOK SHELF

Efficiency, Cost and Safety of Storage-Battery Equipment in Bituminous Coal Mines, and Some Comparisons With Wired Transmission of Power, by C. W. Owings and D. C. Jones. John D. Beatty, Carnegie Institute of Technology, Pittsburgh, Pa. 283 pages, 6x9 in.; paper cover. Price, $2.

Shall the coal industry scrap its trolley and wired equipment underground and go over to battery power? Shall it place its stakes on cell or wire? This is the subject of the bulletin being reviewed, of which every page will repay close scrutiny. Repeatedly the engineers of the mines having battery equipment have been asked to discuss costs, but declined. This report enters carefully into this question and summarizes its findings thus: "The prevailing idea that storage-battery equipment is too expensive and too unreliable for general use in mines has been shown to be incorrect by a study of batteries as a means of supplying power for coal mines; it is indicated that coal can be cut, gathered and hauled at approximately the same cost by battery trucks and locomotives and by trolley equipment."

"Storage-battery trucks," says the report, "greatly facilitate the travel of mining machines and greatly extend the distances these machines can travel, as well as decrease the time of travel between places." A top and center-cutting machine has a power consumption of 0.33 kw.-hr. per place and a bottom-cutting shortwall machine, one of 0.46.

"Comparative tests of battery locomotives and cable-reel locomotives in the same sections of the mine," say the authors, "indicate that in two tests the former was 82 to 165 per cent respectively more efficient. The speed of the battery locomotives tested was less than that of the cable-reel locomotives and tests have shown slower-speed gathering locomotives to be 58 to 68 per cent more efficient than medium-speed locomotives. Part of the difference in power consumption of the two types of gathering locomotives is undoubtedly due to the slower speed.

"The efficiency of gathering haulage was 40 to 58 per cent for the battery system and 62 to 70 per cent for the trolley system. However, the trolley system has an apparent advantage over the battery system in that efficiencies of the former are based on an average voltage rather than on the fluctuating voltage delivered to the equipment and does not take into account the effect on the equipment of the low voltage which was apparent in both trolley systems studied.

"The estimated costs for the items compared of producing a ton of coal, exclusive of cost of track and substation or charging buildings, was 23.13c. at one trolley mine and 24c. at another mine operating from a trolley system; the cost of battery operation was 22.82 and 24.14c. per ton. The differences, such as character of coal, makes of equipment and mining methods, do not allow a common basis of comparing mining costs, but it is apparent that the battery power is as cheap as wire distribution of power."

An Investigation of the Friability of Different Coals, Bulletin No. 196, by Cloyde M. Smith. University of Illinois, Engineering Experiment Station, Urbana, Ill.; 50 pages, 6x9 in.; paper cover. Price, 30c.

The investigation which this book describes attempted to formulate a method of ascertaining the relative friability of coals. A tabulation of friabilities from this book, slightly shortened and rearranged, follows:

Relative Friability of Illinois and Other Coals

Coal	Size	Degradation by Weight, Per Cent	Degradation by Size Per Cent
Cannel coal, La Salle County	2½x2	18.1	7.4
	3x2½	23.1	9.8
Anthracite	3x2	30.9	12.1
Jellico, eastern Kentucky	3x2	33.3	13.2
Williamson County, Illinois	3x2½	44.8	22.8
	2½x2	42.1	22.8
Saline County, Illinois	3x2½	43.7	23.6
	2½x2	52.7	28.1
Franklin County, Illinois	3x2½	43.3	24.2
	2½x2	47.2	26.6
La Salle County, Illinois	2½x2	46.3	24.3
	3x2½	42.9	24.4
La Salle County, Illinois	3x2½	45.1	25.0
	2½x2	49.5	28.0
Sangamon County, Illinois	2½x2	52.7	28.1
	3x2½	49.7	28.3
Saline County, Illinois	2½x2	60.0	31.8
	3x2½	56.7	32.1
Sangamon County, Illinois	3x2	60.2	32.8
Pocahontas	3x2	63.6	39.1

The author says that at least 500 lb. is required to give enough test material for satisfactory results. Plus 3-in. material should be broken with hammers to pass a 3-in. screen, the portion remaining on the 2½-in. screen being the acceptable 3x2½-in. test supply. Hand fitting of pieces is permissible because small screens sometimes fail to pass the full quantity of coal of the proper screen size. A 10-ft. drop is recommended into a surface of concrete, the coal being released from a basket of about 18x30 in. equipped with quick releasing bottom doors. Care should be taken to avoid using in the test any pieces that obviously have broken since the sample was screened and that are checked by cracks and are on the verge of falling apart.

* * *

Sampling and Analysis of Coal, Coke and By-Products; Third Edition. Bureau of Technical Instruction, Carnegie Steel Co., Pittsburgh, Pa. 348 pages, 6 x 9 in.; cloth. Price, $3.

Seldom does a book come to a reviewer's desk with so much authority as this one. It has been prepared for the immediate use of the United States Steel Corporation's chemists by a committee specially appointed, of which J. V. Freeman is chairman, and it represents the standard practice of the company's laboratories. It covers the sampling of coal and of coke, the laboratory preparation of samples, physical tests for coal and coke, methods of analysis, examination of products and materials from the ammonia-recovery plant, of light oil and benzol products, of coal-tar and tar-refinery products, of pitches, creosote oils, crude-tar acids and crude and refined naphthalene.

OPERATING IDEAS *from* Production, Electrical *and* Mechanical Men

Lays Wood Floor at Room Face To Keep Out Refuse

IN MINING a seam of coal underlain by a soft bottom, much refuse will be scraped up in cutting and subsequently loaded out with the coal. The bottom may be quite hard *in situ*, but when exposed to the air it may soften. In that case, it is impossible to cut in the bottom, under the coal. The latter conditions are encountered by the Virginia Jellico Co. in mining the 36- to 44-in. Jellico seam in its King Mountain mine at Clairfield, Tenn., according to T. R. Mitchell, superintendent.

Owing to the thinness of the bed, it is not practicable to leave an inch or two of coal on the bottom, and so the cutting machines must be made to operate directly on the rock bottom. In order that the material from the bottom shall not become mixed with the coal, a board floor is placed adjacent to the cut. Prior to the adoption of this method, when the coal was loaded directly from the rock bottom, the smallest sizes of coal ran from 12 to 20 per cent in ash, with the result that 70 per cent of the machine cuttings were too dirty to be loaded out.

Rooms are turned on 80-ft. centers and widened to 40 ft., pillars being brought back immediately upon completion of the room. The wooden floor is made in sections, each 4 ft. wide and 10 ft. long, of rough 1-in. lumber. Eight of these sections make a room set, they being placed four wide and two deep against the face of the coal and on the soft bottom. The over-all dimensions of the floor, consequently, are 40 x 8 ft. The cutting machine is unloaded onto this floor over a 4 by 6 which is kept in the place for this purpose, being considered a part of the floor set.

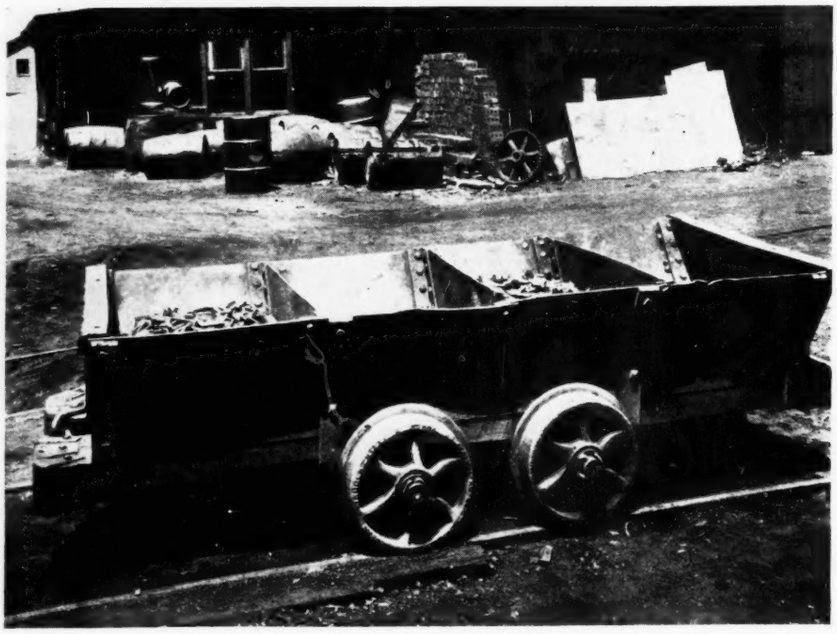
In this arrangement the cutting machine is unloaded from the track and cuts across the face without touching the bottom. Machine cuttings are deposited on the floor, from which they can be loaded out as clean coal. Much of the coal that is blasted falls on these boards, and is loaded out comparatively free of extraneous refuse. In order to insure clean coal, that which must be shoveled directly from the clay bottom is gobbed. After the miner has scraped the bottom, he pushes the boards forward to the face and is then ready for another cut. These boards are also used in driving entries and in pulling pillars. Every place in the King Mountain mine is floored with them.

Daily analyses show that the average ash content of screenings is only 7 per cent, as against 12 to 20 per cent prior to the introduction of this system. What is more, power consumption in cutting has been lowered and the number of tons per machine per shift increased, the net result being cleaner and cheaper coal.

Steel-Bin Bit Car

Many Illinois mines differ from the Pennsylvania method of distributing sharpened cutter bits and collecting dull ones. Whereas in the former state bits usually are transported in individual boxes, in the latter an open-type bit car frequently is used for the purpose. For those who have reasons for following this last method, a satisfactory bin design is here illustrated.

For Convenient Distribution of Bits



Fire-Fighting Equipment Under Lead Seal

Underground fire-fighting equipment, particularly the portable extinguisher, is frequently tampered with by the worker. He is quite likely at odd moments to play with the extinguisher in order to learn how it works, with the result that when the equipment is most needed it may be out of order.

The management of the Nemacolin mine of the Buckeye Coal Company,

Nemacolin, Pa., has removed this temptation by putting all fire-fighting equipment on the property under a lead seal, similar to that used by utility companies for protecting gas and electric meters. This is accomplished by a small inexpensive sealing machine in the hands of members of the engineering department, the latter being held responsible for the proper functioning of all fire-fighting equipment. Since this method has been put into practice, tampering with fire-fighting equipment has been eliminated.

Inby Haulage Facilitates Robbing Advancing

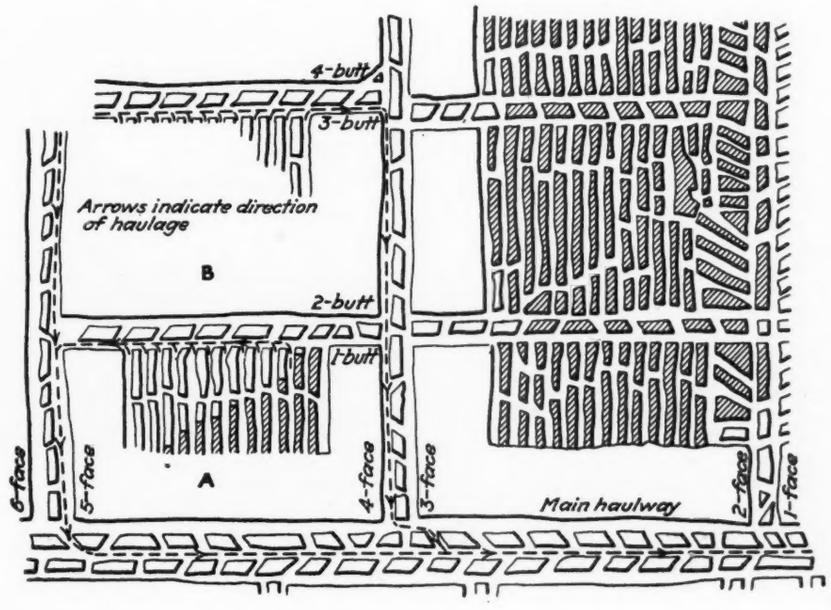
Running true to form for the Eagle bed, the roof in the Ameagle mine, Ameagle, Raleigh County, W. Va., will not stay up long once it is exposed to the air. It is a slate which apparently contains considerable lime. Under such conditions high recovery with economy calls for advance robbing if water does not make it impractical.

There are certain advantages in having the loader who drives the room bring back the pillar and in having him start it immediately after completion of the room. This, however, may introduce a problem of keeping the panel entry open for haulage. Instead of keeping the outby end of the panel entry open, George T. Wahl, superintendent of the American Eagle colliery, which is now operated by the Peabody Coal Co., "takes the coal out through the back door." This method is indicated by the accompanying sketch adapted from a section of the mine map.

Coal from the rooms and pillars in panel "A" is being hauled through "No. 5 Face." No. 3 Butt and No. 5 Face will have been driven to intersection before many of the rooms in panel "B" have been started. This means that only a few switches will have to be taken up and turned around when the direction of haul is changed. When room No. 1 is finished the loader can bring the pillar back immediately and no stump need be left to protect the entry.

According to Mr. Wahl, the loader naturally takes more care in driving a room when he knows that he will bring the pillar back. He will be careful in gobbing slate, so it will not interfere with recovery of the pillar.

Advance Robbing Method Used in the Ameagle Mine



As You Do It

Every mining man has problems to solve, and in these pages the solutions of such difficulties are pooled as in a bank, so that every reader can draw from them at his need. Men of many minds, of varied experience and training, with various degrees of difficulty and with different means of solving their problems, write their solutions, recipes and methods in these columns, and here the reader takes what he wants for his own use, giving his own experience in return. Here then is community of interest, give and take. But the editors of COAL AGE *do not ask you to make your contributory effort for nothing. Ideas, appropriately illustrated, will be paid for, if accepted, at the rate of $5 or more for each contribution—and the drawings need be only such as will enable our own draftsmen to complete the illustration.*

Gathering Mole Head For Pit-Car Loaders

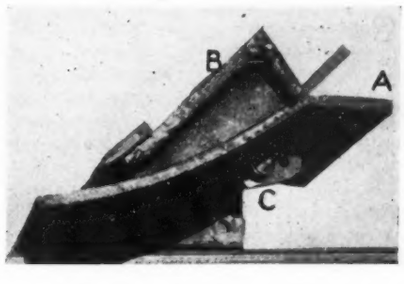
Pit-car loaders have eliminated most of the lifting, but none of the gathering, in the shoveling of coal. W. M. Huffman, superintendent of the Kentenia mine of the Fordson Coal Co., Kentenia, Ky., has felt that a practicable device for gathering loose coal could be developed for addition to this type of machine, and for several years has been experimenting along these lines. The result of his study is a simple reciprocating gathering head which can be attached to a pit-car loader (see Fig. 1)

Fig. 1—Gathering Element, Head On

without requiring many changes in the latter.

This attachment, known as a "mole head," consists, as indicated in Fig. 2, of an apron plate, *A*, which is bolted to the end of the conveyor, and the mole head proper, *B*, which moves forward and backward in a curved path over the surface of *A*, being driven from lugs *C* —extending through slots in *A*—by two connecting rods and disk cranks on a jack shaft. The latter is driven through

Fig. 2—Mole Head, Detached



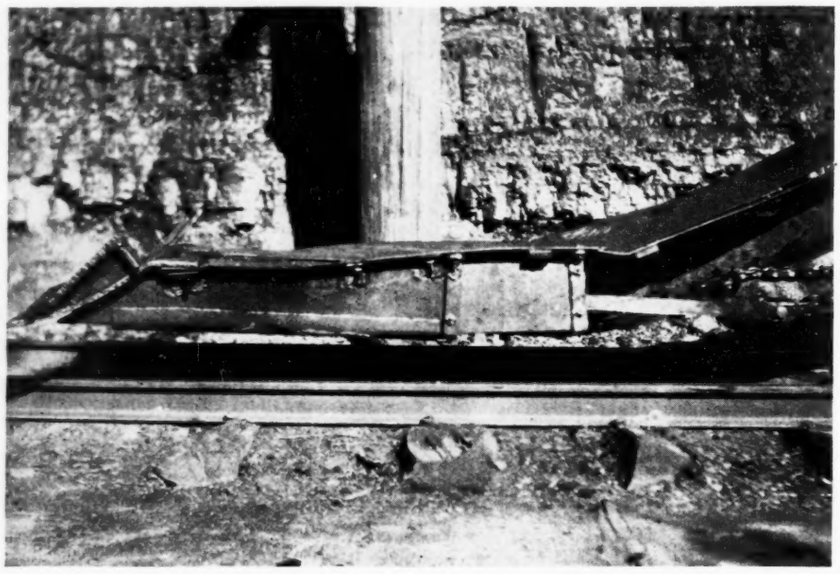


Fig. 3—Chain and Rod Drive

sprocket chains by the main shaft of the conveyor, as shown in Fig. 3.

The curved surface on *A* is formed on a radius of 48 in. and measures 12 in. wide and 40 in. long, while the mole head that moves over this curved surface is 9 in. wide (including a row of teeth on its front end) and 42 in. long. Rollers on the lugs of the mole head hold this piece in its circular path. The stroke of this head is 4½ in. and the cycle is 110 strokes a minute. Mr. Huffman has applied for patents covering the gathering device.

In a recent test this machine loaded 81 tons in 26 man-hours at a cost of $22.91, including the cost of laying track and timbering. It is said that this conveyor has loaded 4,900 lb. of coal in 3⅛ minutes when pushed into a pile of coal at a face by a mine locomotive. Mr. Huffman plans to build a conveyor especially for this head, which will move into the coal and tram by itself.

Lock Sockets for Mines Using Standard Lamps

As lamps in a mine are burned continuously the rated life in hours is soon reached. For this reason it is more important in mine lighting than in many other classes of service that the lamps should not be operated on overvoltage. But here a difficulty is introduced, because in many 250-volt mines the substation is adjusted to carry as much as 300 volts, and lamps rated for a potential near this figure are inherently less rugged than for lower voltages.

If 100- to 120-volt lamps are used, two or three in series, they are likely to be stolen for household use. One coal company has standardized on 115-volt lamps for all inside mine lighting, but protects them against theft by P. & S. "Shurlok" weatherproof sockets. These lamps are connected three in series on the 275 to 300-volt d.c. circuits, and in the regular way on the 110- to 120-volt a.c. circuits.

Trolley-Guard Hose Tied To Steel Messenger

Because of the difficulty of arranging other support, trolley-guard hose usually is allowed to rest directly on the trolley wire. A method of holding it at a uniform height above the wire is shown in the accompanying photograph which was made at the entrance to the Rider Vein, No. 25 tunnel, Olyphant shaft, of The Hudson Coal Co.

Through holes drilled in the hanger fittings and hanger extension pipes, a ⅜-in. steel messenger is held taut by anchors in the roof at each end. At points 1 ft. apart the hose is tied to the messenger by pieces of No. 12 insulated copper wire reclaimed from signal and telephone circuit scrap. This method of support prevents interference with the trolley wheels and reduces wear of the hose.

Trolley Wheel Does Not Have to Raise Hose to Make Contact With Wire

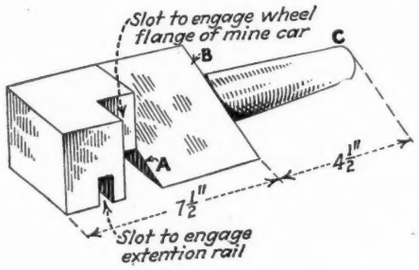
A Safety Wheel Sprag

At almost every mine there are employed at light tasks men who are permanently crippled — many of them having sustained injury in the spragging of or from the overturning of runaway cars. Frequently these accidents result from the use of a poorly designed and constructed sprag; in some instances from the utilization of an ordinary cap piece for stopping the car. It is for the elimination of such accidents that the John Hayes sprag, here described, has been devised, writes W. H. Luxton, of Linton, Ind.

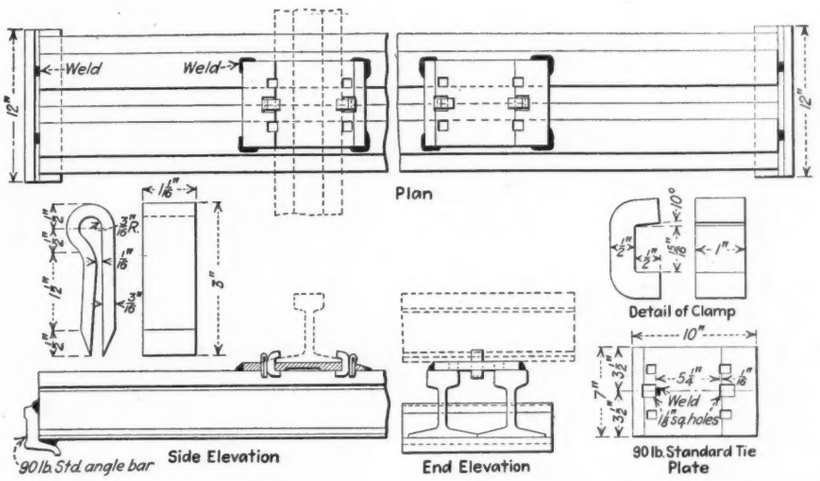
It is fashioned from a piece of a sound mine tie, say 2½x5x12 in., in accordance with the design set forth in the accompanying illustration. *B* and *C* are the two extremities of a handle which is made 4½ in. long. In section *A-B* is a wedge which rests on the ball of the track rail and under the wheel of the mine car. The slot at *A*, about 1½

in. wide, engages the flange of the wheel, allowing the wedge section to make a close tangential fit against the flat tread of the wheel. When the wheel flange drops into this groove a locking action is created and consequently the sprag is not easily knocked out.

The slot on the under side of the sprag fits the flange of a slide rail set on its side in track extensions at the face. This slot holds the sprag firmly in place under a wheel resting on the slide rail.



A Sprag That Holds



Details of Heavy-Duty Steel Tie

narrow-gage surface track over which steam locomotives operate. Details of this particular type of tie are given in the accompanying sketch and require no elaboration.

Trolley Wire Extensions Require Foreman's O.K.

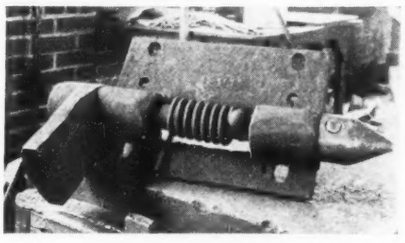
Promiscuous and careless extensions of the trolley wire in mines may become the cause of a serious accident. To guard against this danger, the management of the Nemacolin mine of the Buckeye Coal Co., Nemacolin, Pa., has created a rule whereby, in making extensions to trolley wires, mine electricians are required to leave a 16-ft. gap between the live wire and the extension wire. On the completion of all except this 16-ft. gap, the electrician notifies the mine foreman, who then sends a capable assistant to examine the location before the extension is connected into the system. This man examines the roof for weakness and the site for gas and other dangers. The final connection is made in his presence.

Tie from Scrap Rails for Underground Use

Heavy steel ties, made of scrap rails, may have a fitting application to mine track, both inside and outside, where the traffic is heavy and also where the life of wood ties is determined by decay and other natural causes rather than by mechanical wear. One anthracite company is testing the relative merit of such a tie in comparison with several types of manufactured steel ties and with wooden ties, treated and untreated. One hundred of them are installed; 50 are being tested underground in a main haulage road and 50 are being tried in

Damage to Cars Avoided By This Tripper

On one of the types of cages in common use the shaft of the tripping device is provided with a square-shouldered collar, which may catch on the iron bands on the bodies of certain types of mine cars when caging is done in the direction toward the lock-arms. Such was the difficulty experienced at the No. 8 mine of the Peabody Coal Co.



Bullet Nose on Tripper

It was finally corrected by replacing the square collar with a bullet nose, as shown in the accompanying illustration.

Obtain Slower Speeds by Opening Rotor Phase

Opening the circuit to one ring of a three-phase rotor is a permissible and practical method of operating the motor at a lower speed than the available resistance for normal three-ring operation will permit. When the circuit to one rotor collector ring is open, the other two phases of the winding form a single phase secondary. This results in a motor torque which is less than if all three rings are in circuit.

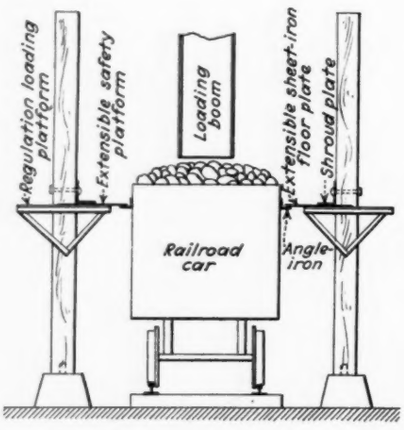
This connection is used on the first controller point of certain types of equipment to obtain a lower starting torque without installing added grids in the resistance. Another application is to obtain a reduced motor speed without the use of a resistor.

Mechanical Trouble May Burn Out A.C. Coil

Burn-outs of contactor coils on a.c. control equipment may be due to mechanical troubles which prevent the armature from moving to its full-closed position. Even a slightly abnormal air gap will prevent the coil current from decreasing to its regular closed-armature value. Not many a.c. control coils are designed to stand for more than a few seconds the current which they take when the magnetic circuit is open and the impedance is at a minimum. This possibility of higher coil current does not pertain to d.c. equipment because conductor resistance is the only factor limiting the maximum current.

Extensible Platform Under Coal Tipple

Workmen loading railroad cars under tipples are exposed to several accident hazards. They may sustain injury by falling between the loading platform and the car or, if working on the ground near a car, they may be hurt by falling coal. What is more, unless some means is provided to prevent spillage from the car, coal will accumulate about the track and make working conditions unsafe. H. La Viers, Sr., general manager of the North East and South East coal companies, Paintsville, Ky., has put into service a car-loading platform floor de-



This Device Leaves No Gap Between Car and Platform

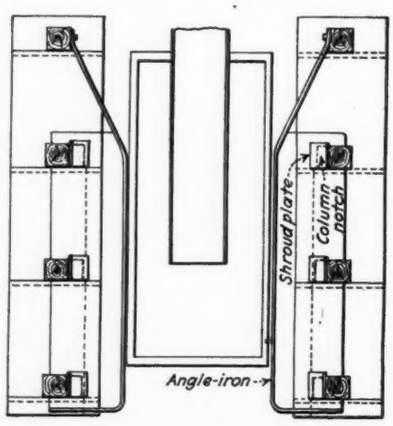
signed to overcome the shortcomings of regulation platforms. Details have been provided by G. E. Daugherty, safety engineer of the company.

The platform floor is extensible, allowing it to be adjusted so that its edge nearly touches the side of the car. It consists of a large strip of heavy sheet iron, with a projecting edge faced and reinforced by an angle iron. Attachment of these two pieces is by rivets or bolts. Where the sheet iron meets the vertical columns of the tipple, to which the main platform is anchored, notches are cut into it. Almost touching the sheet iron and directly over these notches are large angle plates anchored to the vertical columns. These cover the notches and hold down the false sheet-iron floor when the latter is fully or partly extended. The floor is made extensible by hinging one end of it to a vertical column.

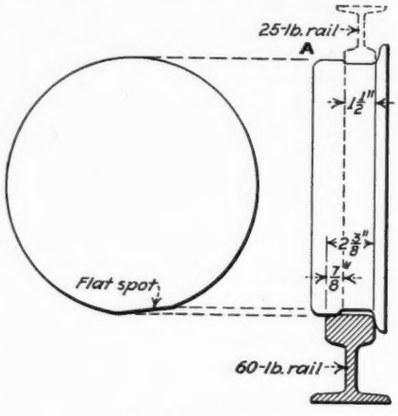
Flat Wheels Run True On Heavy Rails

Where easy and smooth running of trips at slow speeds is desirable—as, for instance, in the feeding of loaded cars to a cage at a shaft bottom—The Hudson Coal Co. uses rails which are heavier than those actually needed to support and control the rolling stock.

An explanation of the reason for this practice should be given. Spragging has been found by The Hudson Coal Co. to be the most effective method of braking on heavy grades, and for this reason is generally practiced in the company's mines. The heaviest grades are usually found in roadways of secondary importance and in working places. It is here that the lightest rail sections are used. In consequence flat spots of the width of these rails develop on the tread of the wheel, next to the flange, beyond which is a false flange, wide but not considerable, which, as indicated in the accompanying sketch, has no flat spots.



If the wheel, though worn, could be induced to travel on this portion of its tread it would move along easily without that bumping which the flat spots engender and without that uncertainty so



The Reason Why

characteristic of a flat wheel. With 60-lb. rail the wheel rests on its false flange because the ball of the rail is ⅞ in. wider than with a 25-lb rail. In consequence the cars run easily, smoothly and dependably.

Red Lead and Linseed For Pipe Joints

A mixture of red lead and boiled linseed oil is recommended by J. F. MacWilliams, electrical engineer of the Pennsylvania Coal & Coke Corporation, for the making of joints in permanent pipe lines for air, water or steam. A short time after application this mixture sets to almost the hardness of glass. Once made with these materials a joint can be broken mechanically only with the greatest of difficulty. As Mr. MacWilliams expresses it, "When properly made the joint will never leak and will last forever."

Loud Speaking Telephone Aids Rapid Caging

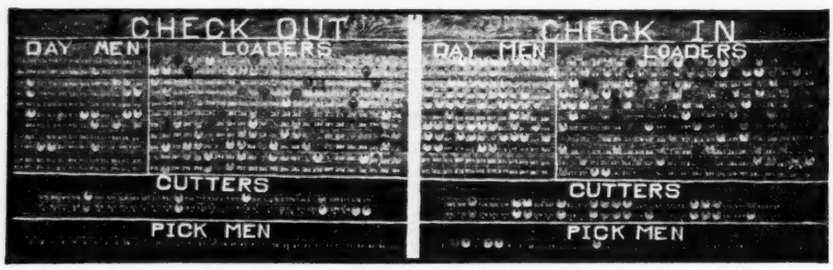
When hoisting is speeded to the point that the caging time is but 1½ to 2 seconds, it becomes difficult for a man safely to pull car checks at the dump. At No. 8 mine, Peabody Coal Co., Tovey, Ill., the checks are pulled at the bottom instead of at the dump. The number is communicated to the weighman through the medium of a loud-speaking telephone.

Mention of this installation was included in the annual report of the committee on application to mining work of the American Institute of Electrical Engineers. Carl Lee, electrical engineer of the Peabody Coal Co., is chairman of this committee.

This Simple Check Board Is Classified by Jobs

Among the operating ideas in the July issue of *Coal Age* was described a check-in board installed at the No. 206 mine (Kentucky) of the Consolidation Coal Co., on which were listed a comparatively great number of jobs. Here is reproduced photographically a check-in board in use at one of the mines of the Pittsburgh Coal Co., on which men are checked under only four main subdivisions of labor; namely, day men, loaders, cutters and pick men. At many mines check boards are so laid out that the checks hung on them represent nothing more than numbers. They should mean more than that and here is shown one idea of a simple breaking down of man groups according to jobs.

How Many Men on Each Job Reported for Work Today?



WORD *from the* FIELD

Coal and Efficiency Men Meet at Knoxville

Operators of southern Kentucky and Tennessee were urged to go into the business of low-temperature carbonization by F. C. Greene, of the Old Ben Coal Corporation, speaking at the annual meeting of the Southern Appalachian Coal Operators' Association held Nov. 15 at the Andrew Johnson Hotel at Knoxville, Tenn. On Nov. 16, the hotel was the scene of the annual meeting of the Southern Appalachian Efficiency Association, which is composed principally of mine foremen and superintendents, and is aided by the operators' association.

Mr. Greene, one of the inventors of the Greene-Laucks carbonizer, said that the Old Ben Coal Corporation is willing to take an interest in and will allow the use of its process in a project which is financed by a group represented by not less than 40 per cent of the coal operators of the district. In the proposed set-up the coal operators would control the low-temperature distillation and reap the benefits.

At the annual election the following officers were re-elected for the coming year: president, V. N. Hacker, president, Pruden Coal & Coke Co., Knoxville, Tenn.; first vice-president, C. M. Moore, president, Moore Coal Co., Knoxville, Tenn.; second vice-president, C. W. Rhodes, vice-president, Fork Ridge Coal & Coke Co., Middlesboro, Ky., and secretary-treasurer, R. E. Howe, Knoxville, Tenn.

"What Constitutes an Intelligent Cost Sheet" was the subject of the efficiency association meeting, presided over by the president, C. G. Cross. W. H. Sienknecht, vice-president, Blue Diamond Coal Co., Middlesboro, Ky., said that the cost must be divided into about twenty items in order to properly benefit the operating officials. He favored showing the total amount of each item as well as the cost per ton, because a sizable figure may appear insignificant if shown only in mills per ton.

L. F. Safriet, manager, Gatliff Coal Co., Gatliff, Ky., said that at the Gatliff mines it is the practice to make up a cost statement every ten days for the benefit of the mine foremen and assistant foremen. The chief electrician and his assistants also have access to these cost statements. The meeting was concluded with the election of the following officers: president, U. S. Wilson, Cambria Coal Mining Co., Briceville, Tenn.; vice-president, L. F. Safriet, Gatliff Coal Co., Gatliff, Ky.; secretary, R. E. Howe, Knoxville, Tenn.

ROBERT M. LAMBIE

A leader in safety work in West Virginia for ten years, Mr. Lambie has been reappointed Chief of the Department of Mines by Governor William G. Conley for a fourth term expiring Dec. 31, 1933.

To Vote on Wilkes-Barre Sale

Stockholders of the Glen Alden Coal Co. will meet at Scranton, Pa., Dec. 26, to take action on the offer of the Lehigh & Wilkes-Barre Coal Co., Wilkes-Barre, Pa., to sell its anthracite coal lands and properties, including the Honey Brook Water Co., to the Glen Alden company for 676,000 shares of stock. The transfer, if authorized, will take place Jan. 2, 1930.

To Appeal Patent Case

The defendants in *Sutton, Steele & Steele and American Coal Cleaning Corporation vs. Gulf Smokeless Coal Co. and Roberts & Schaefer Co.* have appealed from the decision of the U. S. Circuit Court of Appeals denying them a rehearing to the Supreme Court of the United States. The case (see *Coal Age*, Vol. 34, p. 709) involves a charge of alleged infringement on patent rights covering processes and apparatus for separating and grading material. Pending the appeal, the injunction and award of damages issued by the trial court against defendants continues inoperative.

Fair Trade-Practice Code Adopted in Utah

Nearly one hundred producers and sellers of bituminous coal met in Salt Lake City, Dec. 3, to adopt a code of trade practices for the marketing of bituminous coal. At the conclusion of the meeting the code was submitted to the Federal Trade Commission for approval and promulgation in accordance with its rules. The conference was held under the auspices of the Utah Coal Producers' Association and was conducted by William E. Humphrey, Federal Trade Commission, Washington, D. C., assisted by Judge George McCorkle, also of the Commission.

The code is composed of nineteen so-called rules. Furthermore, Commissioner Humphrey granted a request made by E. R. Clayton, secretary, Harlan Coal Bureau, and R. E. Howe, secretary of the Southern Appalachian group, who also represented the Virginia, Alabama and Hazard organizations, "to make any reservations that might later be desired by members of the bureaus or associations which they represented." Commissioner Humphrey indicated that the Commission would act on the code within 60 days.

New Plant Construction

New contracts for topworks and construction under way or completed at various coal operations reported in November include the following:

Allegheny River Mining Co., Kittanning, Pa.; contract let for rebuilding Mohican tipple, Furnace Run, Pa.; steel structure, Marcus screens and rotary dump; capacity 2,000 tons per day.

Carrolltown Coal Co., St. Benedict, Pa.; contract closed with Fairmont Mining Machinery Co., for rebuilding Victor No. 9 cleaning plant. Contract includes steel structure and Peale-Davis table.

Pittsburg & Midway Coal Mining Co., Pittsburg, Kan.; contract closed with United Iron Works, Inc., for all-steel tipple equipped with screens, picking tables and loading booms for preparing lump, egg, nut and slack; capacity, 1,500 tons per day.

Standard Fourth Vein Coal Co., Linton, Ind.; new tipple, capacity 125 tons per hour now under construction. Contract closed with Morrow Mfg. Co. for shaking screens, picking tables and loading booms.

Stephenson-Finnimore Coal Co., Pittsburg, Kan.; contract closed with United Iron Works, Inc., for steel tipple equipped with screens, picking tables and loading booms for preparing lump, nut and slack; capacity, 800 tons per day.

Weir-Cherokee Coal Co., Pittsburg, Kan.; contract closed with United Iron Works, Inc., for all-steel tipple equipped with screens, picking tables and loading booms for preparing lump, nut and slack; capacity, 800 tons per day.

West Virginia Coal & Coke Corporation, Omar, W. Va.; new four-track, all-steel tipple equipped with shaking screens, picking tables, loading booms and refuse-disposal machinery planned for Littles Creek mine, Stirrat, W. Va. The capacity is 500 tons per hour

Legal Phases of Stabilization to Fore at American Mining Congress Meeting; Map Out 1930 Mechanization Program

RENEWED STUDY of the possibilities of stabilization of the mineral industry with special inquiry into the effects of existing anti-trust laws upon the movement was recommended by members of the American Mining Congress at the thirty-second annual convention of the organization, held at the Mayflower Hotel, Washington, D. C., Dec. 4-7. A resolution calling for the appointment of a committee to make such a study and suggest any necessary changes in the statutes was adopted the final day of the meeting.

Impetus was given this action by the address of Robert E. Tally, president of the Congress, at the opening session. "The greatest service that the American Mining Congress can render to the mining industry and to the nation," he said, "is co-operation directed to the proper utilization and conservation of the country's mineral resources." Conservation of the right kind, he pointed out, is the key to stabilization. It offers a practical means for the elimination of uneconomic production and for the adjustment of supply to demand."

The producer must be assured, however, that collective curtailment is within the law. "Conservation," continued Mr. Tally, "is the only practical solution of overproduction." But it should not be extended "to the stage where high-cost production will be made attractive. Conservation will fail if misused in the maintenance of unreasonably high prices and the restriction of competition. It will also fail unless producers co-operate in the adjustment of supply to demand and unless collective curtailment without abuses and without governmental regulations, is made permissible."

Mechanization had its innings at the morning session on Dec. 6. F. A. Merrick, president, Westinghouse Electric & Manufacturing Co., led off with an address on "The Machine Myth," in which he declared that the fear of the machine was passing out of the picture. Workmen are no longer frightened by the machine bogey and, when they properly understand the possibilities of the machine, are more ready to co-operate. This suggested to the speaker the value of continuing education that the myth should not again take root in the minds of men.

Dr. L. E. Young, chairman, national committee on mechanized mining, announced that little time would be spent upon a review of the achievements of the closing year. The outstanding developments, as he saw them, were improvement in design and construction of equipment to the point where the machines met all reasonable demands, the increased number of units in use and the large increase in the employment of mechanization in thin seams and under bad roof. Turning to the question of a future program, he stated that consideration should be given too:

(1) Expansion and acceleration of the collection of statistical data on machine operation and tonnage; (2) engineering reports; (3) extension of present studies to take in auxiliary face and transportation equipment; (4) training of supervisory force and workers in mechanical loading; (5) intensive study of best layouts under different operating conditions; (6) safety and safety records; (7) local field meetings; (8) cost accounting methods, and (9) how data obtained should be distributed.

Joseph D. Zook, vice-chairman, stated that between 40 and 50 per cent of the Illinois tonnage this year would come from mechanized operations. In November, he said, the Illinois mines were using 1,713 pit-car loaders, 161 large machines, 2 scrapers and 48 shovels. Union leaders, he added, had abandoned their traditional opposition to the machine.

MOST of the work done in mechanization, remarked Eugene McAuliffe, president, Union Pacific Coal Co., has been a process of experimentation. There is still too great a lack of system. He suggested that the time was ripe for a text-book on mechanized mining. Paul Weir, vice-president, Bell & Zoller Coal & Mining Co., thought that safety records would improve with better training of workers.

F. S. Pfahler, general manager, Superior Coal Co., said that, fearing an increase in the accident rate when his company began large-scale use of pit-car loaders, supervision was increased and more safety men put on. The number of men under each district manager was cut from 200 to 100, with the result that accidents measured in tonnage had materially decreased. There had been no fatal accidents. He felt that changing loading from a tonnage to a day basis had contributed to the reduction in the accident rate. J. A. Long, general manager, Woodward Iron Co., also indorsed the contention that accidents decrease with mechanized mining because of better supervision.

Mr. Zook suggested that statistics on tonnage and accidents should be collected by the U. S. Bureau of Mines. Dr. Young thought quarterly reports desirable. F. G. Tryon and W. W. Adams, U. S. Bureau of Mines, expressed a willingness to co-operate as far as resources and policy of the Bureau would permit. George S. Rice, chief mining engineer, U. S. Bureau of Mines, warned the meeting that mechanization introduced new hazards, but he felt that in the end concentrated mining would mean safer mining.

R. L. Ireland, Jr., general manager, Wheeling & Lake Erie Coal Mining Co., stated that this company had been gradually building up a force of men with more than "practical" training. Practical training came first, but the company also was seeking men with high school or college education for section bosses and higher supervisory positions. Machine runners were selected from younger men with some education and a willingness to co-operate. The right of appeal to the superintendent was accorded each worker and that right had led to the discharge of a number of foremen guilty of favoritism.

The convention opened with an informal luncheon at which brief remarks were made by a number of coal and metal men. Mr. Zook stressed the recovery of Illinois tonnage since 1927. E. W. Parker, director, Anthracite Bureau of Information, laid emphasis on the day of automatic heat and told how the hard-coal operators were preparing to meet the issue. Allan H. Willetts, chief of the bureau of economics, National Coal Association, pointed out that average normal production of bituminous coal had now climbed to 525,000,000 tons per annum. He commented upon the lack of substantial profits as a drawback, but on the favorable side of the ledger of the soft-coal industry set down mechanization and the growth of the trade-practice movement.

That a Third International Conference on Bituminous Coal would be held at Pittsburgh in 1931 under the auspices of Carnegie Institute of Technology was announced by President Thomas S. Baker, who addressed a special coal session of the convention held Dec. 5

Bureau of Mines Approves Explosive

One change in the active list of permissible explosives was made by the U. S. Bureau of Mines in November. In addition, Approvals No. 1 and No. 2 were granted the Cardox Model A and Model B permissible blasting devices, respectively, under the provisions of Schedule 20.

Change in the List of Permissible Explosives During Month of November

	Vol. Poisonous Gases	Characteristic Ingredient	Weight of 1¼x8-in. Cartridge, Grams	Smallest Permissible Diameter, Inches	Unit Deflective Charge, Grams	Rate of Detonation in 1¼-in. Diameter Cartridge, Ft. per Sec.
*Hercoal D	B	Ia	98	1	237	8,890

*Hercules Powder Co., Wilmington, Del.

and presided over by J. B. Warriner, vice-president and general manager, Lehigh Coal & Navigation Co. Dr. Baker reviewed the advances already made in research studies in new uses for coal and reiterated his belief that research which had hurt the industry in the past would also usher in a new and better day for coal.

Because of the illness of C. J. Ramsberg, vice-president, Koppers Co., his paper was presented by H. J. Rose, assistant director of research for that company. This presentation also emphasized the value of and necessity for research. Special mention was made of the recovery of sulphur in purifying byproduct coal gas and the profitable market for that sulphur as an insecticide and fungicide. The wide range of products which could be made from the tars also received attention.

Speaking for the hard-coal industry, Daniel T. Pierce, vice-chairman, Anthracite Institute, outlined the steps which had been taken to put anthracite in tune with the revolution in household consumer demand for heat. Quality had been improved and real engineering service made a part of merchandising. Research work has been launched with a view to "developing, encouraging and bringing about the use of better devices in which to burn anthracite." The research work, he added, includes study of heat control, mechanical stokers and automatic ash disposal.

Taxation questions loomed large in the program of the convention. The burdens of taxes on undeveloped mineral lands and the pressure such taxation exerted in increasing overproduction were set forth. There was considerable discussion on depletion allowances, centering around the Parker report on the subject. When the smoke of battle cleared away the Congress went on record as favoring the fixing of depletion allowances on the basis of income and suggested 33⅓ per cent of the income as the basis, with the proviso, however, that any change in the law putting this into effect would permit companies now using some other basis to continue their present system.

"Rank" and "Type" of Coal Defined at Meeting

Formal action on a recommendation on nomenclature was taken at the joint meeting of the technical committees of the Sectional Committee on the Classification of Coal, sponsored by the American Society for Testing Materials and operating under the rules of the American Standards Association, at Philadelphia, Pa., Nov. 22. "Rank" shall be used in the deliberation of the committee to denote the degree of transformation undergone by any particular coal in progress from peat to anthracite. The number of ranks and sub-ranks was left undecided. "Type" shall be used to designate the character of a coal as conditioned by the original vegetable matter from which it was derived.

Industrial Leaders Pledge Expenditures For Business Expansion in 1930

FOUR HUNDRED business executives, whose activities encompass industrial endeavor, gathered in Washington, D. C., Dec. 5, to take part in the National Business Survey Conference, called by the Chamber of Commerce of the United States at the request of President Hoover to set in motion a survey looking to the stabilization of business and the maintenance of the national economic momentum. The conference was in furtherance of the effort by the administration to instil business optimism and dispel any fears as to the future of business in general which might have grown out of the recent stock market collapse.

The purpose of the meeting, as President Hoover pointed out in the opening address, was to organize a counter-offensive in the form of construction and maintenance work to take up any slack in unemployment which may arise in other activities. Business men and economists are agreed that the acceleration of these activities in time of need is a "great balance wheel of stability." By concentrating on development work, such as the construction of highways and the establishment of utilities, the standards of living are raised and the demand for goods is increased.

President Hoover did not attempt to hide the fact that there is unemployment and that there has been a reduction in the demand for certain types of goods, but his plea was to squeeze the emotion out of the situation, because emotions, "if they had been allowed to run their course would, by feeding on themselves, create difficulties." The Federal Reserve System has been a strong line of first defense but the next move is to obtain pledges from leading employers that there will be no movement to cut wages and to secure corresponding assurances from labor leaders that they will co-operate to prevent labor conflicts.

Robert P. Lamont, Secretary of Commerce, asserted that people are convinced of the essential soundness of our economic structure and of our economic future. The task of the business men of the United States now is to justify that confidence, and, to assure that it is continued, the present is the proper time to replace and modernize equipment. And last but not least, wages and employment, "which spell buying power," should be maintained at their present levels.

"The nation is now looking to you business men to get out of the huddle of 'conferences' and play ball," was the statement of Dr. Julius Klein, Assistant Secretary of Commerce. Reviewing conditions in important fields, Dr. Klein said the situation called for neither outbursts of excessive buying nor undue frugality in spending. "Brass tack" realities are to be preferred to emotional extremes.

Julius H. Barnes, chairman of the board of the Chamber, outlined the scope of the task set for the conference and the methods by which it might be accomplished. As a groundwork for more definite action, brief reports summarizing conditions in 32 key groups represented at the conference were presented by outstanding executives in the specific industries. These were, in keeping with the purpose of the gathering to build up a basis of fact, frank statements of the situation and outlook in these industrial groups. In the main they confirmed the earlier impressions given at a series of conferences at the White House—that business was proceeding for the most part in an orderly way.

Class 1 railroads expect to spend $370,000,000 for new equipment and $680,000,000 in promoting a greater operating efficiency in 1930, said R. H. Aishton, chairman, Association of Railway Executives. The situation as of

Underwood & Underwood

At the National Business Conference

Front row, left to right: J. B. Warriner, vice-president and general manager, Lehigh Coal & Navigation Co.; Joseph E. O'Toole, resident vice-president, National Retail Coal Merchants' Association; Warren Bixler, president, American Wholesale Coal Association; Daniel T. Pierce, vice-chairman, Anthracite Institute. Back row: Harry L. Gandy, executive secretary, National Coal Association; Milton E. Robinson, Jr., president, National Retail Coal Merchants' Association; C. E. Bockus, president, National Coal Association.

W. D. Brennan

Has resigned his position as general manager in charge of the Dawson (N. M.) coal properties of the Phelps Dodge Corporation to become president of the Utah Fuel Co., Salt Lake City, Utah, effective Jan. 1. Mr. Brennan has been identified with the Phelps Dodge Company for the past twelve years and has been a director of the Colorado & New Mexico Coal Operators' Association for the same period, besides serving as president of the organization for the last two years.

Oct. 1 showed a greater authorized program of improvements and capital expenditures under way than in any similar period in five years.

Public utilities will spend $1,400,000,000 during 1930 for new construction, Matthew S. Sloan, president, National Electric Light Association, reported, an increase of $110,000,000 over last year. In addition they will spend $410,000,000 for maintenance. Business has grown during 1929 and is expected to continue its normal course in 1930.

Shipments of cement will be approximately 3 per cent lower in 1929, as compared to 1928, said Frank H. Smith, president, Portland Cement Association. The outlook for 1930 anticipates shipments possibly 5 to 10 per cent lower than this year.

A profitable 1929 will enable the steel industry to make long deferred improvements, declared James A. Farrell, president, United States Steel Corporation, and chairman of the board, United States Steel Institute. Expenditures already authorized and definitely planned in the industry approximate $500,000,000.

Gen. Otto H. Falk, president, Allis-Chalmers Manufacturing Co., declared that the machinery manufacturing group was just concluding the biggest year of its history and that no recession is expected in the coming year.

Alvan Macauley, president, National Automobile Chamber of Commerce, anticipated that the stock market crash would affect the automobile industry more or less in line with the general trend throughout the United States. Life insurance companies foresee no increase in unemployment, as production in October showed no recession from the general level, which is 5 per cent more than last year.

Bituminous coal production thus far in 1929 has been about 30,000,000 tons above that of the same period in 1929, declared C. E. Bockus, president, National Coal Association, indicating a production for the calendar year 1930 of 530,000,000 tons. On the whole, the tendency has been toward a slightly better financial showing this year as compared to last, due not to increased realization but to economies in production. Unusual expenditures totaling $44,000,000 are planned by 165 companies.

Milton E. Robinson, Jr., president, National Retail Coal Merchants' Association, reported that inventories, credits, markets and comparative sales seem to be about normal in the retail coal business. The attitude of the buying public, however, is of the hand-to-mouth variety, though the outlook for the present winter season appears to be good. Expenditures for 1930 will be comparable to other years, and 2,303 retailers, comprising about 10 per cent of the total number, anticipate total expenditures for new equipment and maintenance of $10,584,825 in 1930.

Supervision of the program of industry co-operation, will be placed in the hands of an executive committee made up of industrial leaders. This committee will be named by Julius H. Barnes, as permanent chairman of the conference, and will constitute approximately twenty individuals. In addition a group of 60 "key men," based on trade association representation, will serve as a special liaison committee to represent the conference and discuss immediate procedure.

Personal Notes

Robert Worthington, president, Summit Oil Co., will succeed Harry Van Mater as president of the National Fuel Co., Denver, Colo. Mr. Van Mater will enter other business activities, though still retaining active management of the Royal Fuel Co., Denver.

I. Newton Bayliss, formerly of the Union Colliery Co., St. Louis, Mo., and for some time general superintendent of the Utah Fuel Co., Salt Lake City, Utah, has resigned to become general manager of the Union Pacific Coal Co., with headquarters at Rock Springs, Wyoming.

William J. Duncan, resident manager, Philadelphia office, Cosgrove & Co., has been appointed Eastern sales manager, with offices in New York City.

Francis R. Wadleigh, consulting mining and fuels engineer, and Ernest L. Bailey, formerly general superintendent, mining subsidiaries, Allied Chemical & Dye Corporation, announce their association as the firm of Wadleigh & Bailey for rendering consulting and engineering service to the coal-mining and fuel-consuming industries. Offices will be maintained in New York City and Washington, D. C.

R. H. Knode, president, Virginia

Charles O'Neill

Identified with the coal industry in central Pennsylvania for nearly thirty years and for the past twelve years secretary of the Central Pennsylvania Coal Operators' Association, Altoona, Pa., Mr. O'Neill has resigned that office to become vice-president in charge of sales, Peale, Peacock & Kerr, Inc., and affiliated companies, with offices in New York City. During the war Mr. O'Neill was production manager for the central Pennsylvania district for the U. S. Fuel Administration and also acted in an advisory capacity to the labor department of that organization.

Coal & Iron Co., has been elected president of the Stonega Coke & Coal Co., Big Stone Gap, Va., vice Otis Mouser, deceased. He also becomes president of the General Coal Securities Co. and the Wentz company, two of the securities and investment companies of the group of which Mr. Mouser was chief executive officer. E. B. Leisenring, president, Westmoreland Coal Co. and Westmoreland, Inc., has been elected chairman of the board of the Stonega company.

Harlan Operators Meet

The fair trade practice plan and affairs of the organization were the principal themes of discussion at the thirteenth annual meeting of the Harlan County Coal Operators' Association, held at Harlan, Ky., Nov. 20. For the Harlan Coal Bureau, a committee, headed by L. P. Johnson, vice-president, Crummies Creek Coal Co., Crummies, Ky., was appointed to report on a plan for standardization of screens and sizes.

At the annual election of the Association, the following officers were chosen for the coming year: president, D. B. Cornett, president, Cornett-Lewis Coal Co., Louisville, Ky.; vice-president, S. J. Dickensen, secretary-treasurer, Mary Helen Coal Corporation, Coalgood, Ky.; secretary, Edward R. Clayton, Harlan, Ky. (re-elected). For the Harlan Coal Bureau, all officers were re-elected as follows: president, R. C. Tway, president, R. C. Tway Coal Co., Louisville, Ky.; vice-president, D. B. Cornett, and commissioner, E. R. Clayton.

Low-Temperature Fuel For Chicago

The Supercoke Corporation, Chicago, formerly the Illinois Anthracite Corporation, expects to have in operation in Chicago on Dec. 1 a low-temperature distillation plant for converting Illinois and Indiana coals into a domestic fuel. A throughput of 600 tons per day is the initial capacity, which officials of the company expect to increase to 1,500 tons at a later date. Nut coal is to be used in the plant and the char compressed with a small amount of smokeless binder and sold in stove and chestnut sizes to the Chicago dealers under the trade name "Prestcoke." The process to be used has been developed by the company itself and officials state that arrangements have been made for the disposal of the gas and tar. "Prestcoke" is said to be heavy and dense, long-burning, and much less subject to degradation than anthracite.

Industrial Coal Reserves Drop To Twenty-Nine Days

Stocks of anthracite and bituminous coal in the hands of industrial consumers in the United States and Canada on Nov. 1 were 37,313,000 tons, according to the monthly report of the National Association of Purchasing Agents. This figure is about 10 per cent lower than that of a year ago while consumption in October, 1929, on the other hand, was 38,482,000 tons, approximately 8 per cent more than last year.

In considering the present coal situation, the association remarks that it is surprising to note how close the production of coal in October (51,250,000 tons of bituminous) equaled the production in October, 1928 (51,333,000 tons). The same applies to anthracite with 8,333,000 tons in October, 1929, as compared to 8,500,000 tons in October, 1928. In other words, the coal market is now more or less stabilized from the standpoint of being able to anticipate the normal changes in consumption and stocks.

Although coal stocks are lower, showing 29 days' supply as compared with 34 days' supply a year ago, this difference is largely attributable to the policy of carrying lower stocks adopted by the railroads and public utilities. With the present coal situation practically stabilized in labor and transportation conditions, the present stocks of industries seem to be adequate, except in individual cases, to run through the winter.

Estimated total stocks of bituminous coal in the hands of commercial consumers in the United States as of Oct. 1 were 37,500,000 net tons, according to a survey by F. G. Tryon and H. O. Rogers, U. S. Bureau of Mines. This is an increase of 4,400,000 tons since July 1, the date of the last report and a decrease of 3,600,000 tons as compared with the tonnage on hand a year ago. Stocks as of Oct. 1 are also lower than on the corresponding dates in 1927 and 1926.

Consumption during the third quarter averaged 8,713,000 tons a week. Exports averaged 410,000 tons a week and the total of exports and consumption was 9,123,000 tons a week. When compared with the rate of consumption in the corresponding period of last year this is an increase of 5.7 per cent. At the rate of consumption prevailing in August and September, the stocks on October were sufficient to last 30 days, if evenly divided.

Days' Supply of Bituminous Coal in Various U. S. Industries

Byproduct coke	28
Electric utilities and coal-gas plants	47
Railroads	19
Steel mills	27
Other industries	28
Average total bituminous stocks throughout the United States	27

Estimates of Output, Consumption and Stocks in Net Tons

	United States Production	Industrial Consumption	On Hand in Industries
October, 1928	58,914,000	36,500,000	40,778,000
November	53,498,000	35,879,000	41,520,000
December	49,606,000	37,354,000	41,010,000
January, 1929	58,500,000	35,518,000	41,492,000
February	54,000,000	38,175,000	40,808,000
March	44,391,000	40,566,000	40,108,000
April	43,329,000	37,750,000	35,385,000
May	46,480,000	37,298,000	33,468,000
June	42,969,000	34,485,000	31,282,000
July	45,635,000	34,640,000	31,415,000
August	49,843,000	34,361,000	32,712,000
September	51,307,000	34,943,000	34,289,000
October	59,567,000	39,482,000	34,947,000
November 1	.....	.....	37,313,000

Columbia to Develop Mining Research

Plans to develop the School of Mines of Columbia University, New York City, as a center of research and special knowledge have been announced in the annual report of Dean George B. Pegram, of the Engineering School. Reviewing the position of Columbia's School of Mines, Dean Pegram asserted that "leadership will fall to those schools that make of themselves vital centers for the advancement of knowledge and of its applications in the fields of mining and metallurgy."

Expansion of the school's resources for scientific investigation and additions to the staff of teachers and investigators equipped to attack basic problems in mining and metallurgy and allied fields are the first steps in carrying out the new policy. Along this line, Eric Randolph Jette, associate professor of chemistry, New York University, becomes associate professor of metallurgy and will be provided with a new laboratory for carrying on his work. T. T. Read, assistant secretary, American Institute of Mining & Metallurgical Engineers, also has been appointed professor in mining.

Pocahontas Operators Sue To Protect Name

The Pocahontas Operators' Association, in the name of its member companies, filed a bill in the federal court at Indianapolis, Ind., Nov. 26, asking an injunction against one jobber and sixteen Indianapolis retail coal dealers to restrain them from substituting inferior coals for Pocahontas. The action is the climax of an attempt to clear up the retail situation in that city. All, or most of the defendants, are said to be organized in a retail cash coal club, which has defied and nullified the city coal ordinance by attacking it in the circuit court, where it was declared unconstitutional, and, in addition, has caused trouble for the regular dealers of the city, organized as the Retail Coal Club.

The operators ask that the defendants be perpetually enjoined from using the word "Pocahontas," or any colorable imitation thereof, and request damages "in excess of the sum of $3,000, exclusive of interest and costs," for previous use of the name with any coal other than that coming from the Pocahontas field.

Fire Destroys Tipples

The Elkhorn colliery tipple of the Millwood Coal & Coke Co., Maybeury, W. Va., was razed by fire Nov. 25, with damage estimated at $100,000. The cause of the blaze was not determined.

Plans for rebuilding the tipple, conveyor and headhouse of the Benedict Coal Corporation, St. Charles, Va., destroyed by fire a few weeks ago, are now under way. The capacity of the operation is about 1,600 tons per day and the new structures will probably be of concrete and steel.

The ground structures and tipple at the Sargeant No. 1 mine, Sargeant Coal Co., Newburgh, Ind., were destroyed by fire Nov. 18. The mine, which produces about 500 tons per day, had been tied up by a strike until a week before the fire.

Illinois Blast Kills 7

Seven miners were killed and fifteen others escaped injury in a local explosion in the Old Ben No. 8 mine of the Old Ben Coal Corporation, West Frankfort, Ill., Dec. 1. Rock dust confined the ignition, thought to have been caused by an accumulation of gas, to a section about 1¼ miles from the foot of the shaft.

The Chesapeake & Ohio R.R. has been authorized by the Interstate Commerce Commission to construct an extension of 5.4 miles from Marshall, W. Va., into the coal lands of the Gauley Mountain Coal Co., in Fayette County. The extension will serve an area of approximately 14 square miles, estimated to contain 13,700,000 tons of coal. Tonnage of coal and coke for the first year is estimated at 90,000, which will be increased, it is reported, to 232,500 in five years.

Life Is Not "All Work and No Play" at Federal No. 1 Mine of the New England Fuel & Transportation Co., Grant Town, W. Va.

A.I.M.E. Coal Division

Organization of the Coal Division of the American Institute of Mining & Metallurgical Engineers, which is to be formed from the Committee on Coal and Coal Products, has been tentatively completed with the adoption of by-laws at a meeting of the committee in Pittsburgh, Pa., Oct. 22. It is proposed that members interested in coal shall attend a luncheon during the annual meeting of the Institute, New York City, Feb. 21-27, 1930, for the purpose of discussing the activities of the Division and passing on the by-laws. At that time officers will be elected and the organization completed.

Ten standing committees are tentatively provided for, as follows: Papers and Publications; *"Mining and Metallurgy"*; Programs and Meetings; Evaluation of Coal for Making Coke for Blast Furnace Purposes; Coal Preparation; Mining Methods, Bituminous Coal; Mining Methods, Anthracite Coal; Gas and its Manufacture; Coke and its Manufacture, and Activities.

Oil Burners Studied

After a lengthy study of domestic coal- and oil-burning equipment, the Bureau of Public Roads, U. S. Department of Agriculture, has found that "in the average-sized house, where no great savings in furnace attendance can be shown, the cost of heating with oil is invariably greater than the cost of heating with coal—all things considered." The bureau has lately published "A Study of the Oil Burner as Applied to Domestic Heating," after extensive tests dealing with various oil fuels, burners, automatic control devices, temperatures, and unconsumed fuel in the operation of the domestic oil burner.

Referring to minimum-section boilers used to a considerable extent in small homes, the bureau says that "such a type of boiler, even with a favorable air-fuel ratio and with the burner operating at boiler rating will, in general, yield overall efficiencies of not much over 50 per cent, and with a measurable amount of excess air they will drop considerably below this mark."

Earnings and Employment Increase in October

The seasonal increase in coal mining which began in August was continued in October, the increase over September being 2.4 per cent, according to the monthly *Labor Review* of the U. S. Department of Labor. The 1,476 mines covered had in October 336,091 employees whose combined earnings in one week were $10,512,222. Employment in anthracite mining in October increased 4.1 per cent, while payroll totals, owing to steadier operation, increased 28.9 per cent.

Employment in bituminous coal mining was 1.6 per cent greater in October than in September and payroll totals were 8.3 per cent higher as shown by reports from 1,314 mines covering in October 215,782 employees whose earnings in one week were $5,844,625. Six of the eight geographic divisions reported substantial increase in employment, while there were practically no change in the South Atlantic and East South Central divisions, although they joined the other six divisions in showing very pronounced increases in payroll totals.

Coming Meetings

New York State Coal Merchants; group meeting Jan. 9, 1930, at Elmira, N. Y.

American Engineering Council; annual meeting Jan. 9-11, 1930, at Washington, D. C.

American Institute of Electrical Engineers, annual winter convention Jan. 27-31, 1930, at 29 West 39th St., New York City.

First International Heating and Ventilating Exposition; Jan. 27-31, 1930, at Commercial Museum, Philadelphia, Pa.

American Wood Preservers' Association; annual meeting Jan. 28-30, 1930, at Seattle, Wash.

Eastern Ohio Coal Operators' Association; annual meeting Feb. 10, 1930, at Cleveland, Ohio.

American Institute Mining and Metallurgical Engineers; annual meeting Feb. 17-21, 1930, at Engineering Societies Building, 29 West 39th St., New York City.

Second World Power Conference; June 16-25, 1930, Berlin, Germany.

Employment and Payrolls in Identical Bituminous Coal Mines In September and October, 1929

	Mines	Number on Payroll Sept., 1929	Oct., 1929	Per Cent Change	Amount of Payroll Sept., 1929	Oct., 1929	Per Cent Change
Middle Atlantic	395	63,565	65,024	+2.3	$1,637,300	$1,740,098	+ 6.3
East North Central	180	32,434	32,821	+1.2	811,410	964,081	+18.8
West North Central	63	5,915	6,388	+8.0	142,806	169,107	+18.4
South Atlantic	322	52,804	52,814	*	1,370,562	1,414,080	+ 3.2
East South Central	212	39,854	39,802	—0.1	850,065	901,137	+ 6.0
West South Central	30	2,579	2,789	+8.1	57,003	69,836	+22.5
Mountain	100	13,667	14,512	+6.2	472,251	523,542	+10.9
Pacific	12	1,580	1,632	+3.3	67,579	62,744	+ 9.0
Total	1,314	212,398	215,782	+1.6	$5,398,976	$5,844,625	+ 8.3

*Less than one-tenth of one per cent.

Per Cent Change in Each Line of Employment, October and September, 1929

	Establishments	Employment Sept., 1929	Oct., 1929	Per Cent Change	Payroll in One Week Sept., 1929	Oct., 1929	Per Cent Change
Manufacturing	12,816	3,628,765	3,579,932	+ 1.0[1]	$99,529,616	$98,728,668	+ 0.3[1]
Coal mining	1,476	327,960	336,091	+ 2.5	9,019,780	10,512,222	+16.3
Anthracite	162	115,562	120,309	+ 4.1	3,620,804	4,667,597	+28.9
Bituminous	1,314	212,398	215,782	+ 1.6	5,398,976	5,844,625	+ 8.3
Metalliferous mining	342	63,323	63,178	— 0.2	1,912,161	1,933,040	+ 1.1
Quarrying and non-metallic mining	651	39,726	38,613	— 2.8	1,081,771	1,042,019	— 3.7
Public utilities	9,602	738,120	734,224	— 0.5	21,678,320	21,897,914	+ 1.0
Trade	7,658	292,815	303,266	+ 3.6	7,511,613	7,690,956	+ 2.4
Wholesale	1,890	63,486	64,216	+ 1.1	1,964,718	1,953,908	— 0.6
Retail	5,768	229,329	239,050	+ 4.2	5,546,895	5,737,048	+ 3.4
Hotels	1,635	148,134	144,965	— 2.1	2,460,368[2]	2,460,527[2]	[3]
Canning and preserving	542	81,016	55,260	—31.8	1,438,388	930,792	—35.3
Total	34,722	5,319,859	5,255,529	— 1.2	$144,632,017	$145,196,138	+ 0.4

[1]Weighted per cent change for the 54 combined manufacturing industries; the remaining per cents of change, including total, are unweighted. [2]Cash payments only. [3]Less than one-tenth of one per cent.

Bureau of Mines Issues Permissible Plates

One approval of permissible mine equipment was issued by the U. S. Bureau of Mines during the month of November, as follows:

Mancha Storage Battery Locomotive Co.; pit-car loader; Continental Electric Co. 1½-hp. motor and Union Electric Mfg. Co. control, 230 volts, d.c.; Approval 179; Nov. 26 (original approval 179-A, issued Oct. 19, covered 500-volt equipment only).

Markle Doubles Gifts To Lafayette

At the dedication exercises of the John Markle Mining Engineering Hall, Lafayette College, Dec. 6, held in the Colton Memorial Chapel, W. M. Lewis, president of the college, announced that John Markle, donor of $500,000 for the erection of the building, had donated another $400,000 for its endowment, to be used for the payment of the teaching staff, the maintenance of research and kindred purposes. Later at the luncheon held in the gymnasium, it was announced that Mr. Markle would make provisions in his will for another gift of $100,000, raising his benefactions to an even $1,000,000.

On the following day a conference was held on the "Relations of Mining Education in Industry" in Pardee Hall. Prof. H. P. Hammond, Brooklyn Polytechnic Institute, exhibited charts showing the relative time devoted in educational institutions to the various elements in mining and in other engineering courses and the trends of education in this regard; also a chart showing the emphasis placed on various divisions of engineering education by engineers of experience.

Col. Robert I. Rees, president, Society for Promotion of Engineering Education, in his address, said that industry in general needed about 10,000 engineers yearly. Cadwallader Evans, general manager, Hudson Coal Co., described the plan of that company for receiving college graduates. Out of 50 engaged, 27 had been retained, other companies having engaged the other 23 in their service.

Obituary

JOHN J. MACDOUGALL, 42, general superintendent of coal mines, British Empire Steel Corporation, Ltd., Sydney, N. S., died Nov. 14, after an illness of two months. From 1913 to 1919, Mr. MacDougall was manager of the Wabana (Newfoundland) iron ore mines for the Dominion Iron & Steel Co., resigning in 1919 to become mining engineer and later general manager of the Acadia Coal Co., Stellarton, N. S. In 1924 he became resident superintendent, Nova Scotia Steel & Coal Co., Sydney Mines, N. S., and was appointed to the position he held at the time of his death a little over a year ago.

JAMES B. PAULEY, 56, chairman of the board, Miami Coal Co., Chicago, and director, National Coal Association, died by his own hand, Nov. 28. Ill-health and stock market losses are assigned as the reasons.

LEROY GODDARD BINKLEY, 47, president, Pyramid Coal Co. and Binkley Mining Co., with operations in Illinois and Indiana, respectively, and the Binkley Coal Co., wholesale distributors, Chicago, died of heart disease at his home in Marion, Ill., Nov. 16.

WILLIAM SLEEMAN, company mine inspector, Consolidation Coal Co., Frostburg, Md., died at his home in that city, Nov. 11. Mr. Sleeman, who was 74 years old, began work for the Consolidation company in the Georges Creek region when he was nine years old, and, before accepting his last position two years ago, was for 65 years trapper, miner and mine foreman.

WILLIAM M. ZELLER, 68, Indiana coal operator and brick manufacturer, died in Indianapolis, Ind., Nov. 22. In the early days of the Indiana coal industry, Mr. Zeller headed the Zeller-McLelland Coal Co. and later the American Coal Co., which was the largest producer in the Bicknell field for many years.

King Coal's Calendar for November

Nov. 2—Lehigh Coal & Navigation Co., Lansford, Pa., proposes plan for segregation of coal mine and railroad properties. It will be acted upon at a special stockholders meeting, Jan. 15, 1930. If approved, a new company will be formed to take over the mining properties.

Nov. 5—Coal Trade Association of Indiana reviews year's progress and makes plans for the future at the first annual meeting, held at Terre Haute House, Terre Haute, Ind.

Nov. 5—Polish miners call a one-day strike throughout the country as a protest against the finding of the committee of award in Upper Silesia, which gave only a 4 per cent wage increase in that region as compared to 9 per cent in all other regions. Miners in Upper Silesia claim the same increase as granted to their fellow workers.

Nov. 6—John L. Lewis, president, United Mine Workers, makes ten charges of insubordination against state officers of the Illinois Miners' Union in answering injunction proceedings brought in the Sangamon County Court to prevent ousting of Harry Fishwick and other officers of the state organization. Mr. Lewis quoted the United Mine Workers' constitution in denying that the Illinois district is an autonomous organization with power to act without supervision from the international union.

Nov. 6—British mine owners refuse to attend meeting of the coal committee of the MacDonald cabinet and the miners to discuss the proposed national wage agreement, compulsory district schemes to regulate output and sales and nationalization of coal areas proposed by the Labor government. The owners' attitude is that each district should be free to make its own agreements.

Nov. 7—British miners' conference decides to accept the government's proposal for a 7½-hr. day as the first installment of their demands, but not before Herbert Smith, representing the Yorkshire miners, withdrew, saying that it was inconsistent to recommend terms which were not a fulfillment of Labor's pre-election pledge for a 7-hr. day.

Nov. 7—Union of Miners and Mining Industry Workers transmits to the German Ambassador at Warsaw a protest against the importation of Polish coal into Germany as provided by the pending German-Polish trade agreement, now in the last stages of negotiation. Fear is expressed that dumping of Polish coal will lead to new price wars and increase unemployment among German workers.

Nov. 7—United Electric Coal Cos. officially open new stripping operation near Duquoin, Ill.; the capacity of the operation is 7,000 tons per day.

Nov. 13—Owners in West and North Yorkshire, two of the largest coal fields in Great Britain, rebel against their association and declare in favor of accepting the government's proposals for a 7½-hr. working day and compulsory district schemes to regulate output and sales.

Nov. 14—Eleven coal miners killed in an explosion in the Eregli mine, near Zoungouldak, Turkey.

Nov. 19—Second explosion in the Eregli coal mine, near Zoungouldak, Turkey, causes death of eleven additional workers.

Nov. 19—Eighteen miners buried in a cave-in in the Houssu colliery, near Mons, Belgium, rescued unharmed. The cause was supposed to be either a slight earthquake or an explosion.

Nov. 20—National Delegate Conference of the Miners' Federation, representing all the coal fields of Great Britain, vote to accept the government's proposals for a solution of the coal industry's problems, to be embodied in legislation during the present session of Parliament. The proposals call for a reduction in hours per day to 7½, beginning April 6, 1930; a national wage agreement; establishment of a compulsory marketing scheme for the regulation of output and prices, and the gradual nationalization of coal areas. Delegates from Yorkshire and Forest of Dean voted against acceptance.

Nov. 22—Conference between William Graham, president, Board of Trade; Ben Turner, Secretary of Mines, and representatives of British mine operators fail to agree on the government's coal-mining scheme and adjourn without action. Mine owners objected to "government interference" as embodied in its marketing proposal and condemned the plan for a central wage board for the coal industry. Little prospect exists for the introduction of the Cabinet's two coal bills in the next two weeks and it is impossible for the marketing scheme, included in one of them, to go into operation Jan. 1, as planned.

Nov. 26—Pocahontas Operators' Association files a bill in the federal court at Indianapolis, Ind., asking an injunction against one jobber and sixteen Indianapolis retail coal dealers to restrain them from substituting inferior coals for Pocahontas.

Nov. 28—Seven men killed in a mine explosion at Wernbwl colliery, near Swansea, Wales.

Nov. 29—Mine owners and miners in the Newcastle coal field of Australia agree to the settlement of the labor dispute on the basis of a reduction of 12½ per cent in the rate for hewing and 12c. per day in wages.

Coal-Mine Fatality Rates Lower in 1929; Major Disasters Greatly Decreased

THE death rate from accidents in October, 1929, at coal mines in the United States was 3.22 per million tons of coal produced, which compares with 3.98 for September; 4.08 for March, the high of the year; 3.13 for January, the low of the year, and 3.22 for October a year ago. For bituminous mines alone, the October rate for 1929 was 2.95, as compared with 3.55 for September, 3.84 for March and 2.76 for January which were, respectively, the high and low points of the present year, and with 2.93 for October last year. The death rate for anthracite mines alone was 4.92, the lowest rate for the first ten months of 1929, as compared with 6.77 for September and 5 for October, 1928. The highest rate during the period from January to October of this year was 7.30 for the month of June.

These figures are based on accident reports received by the U. S. Bureau of Mines from state mine inspectors and on current reports to the Bureau covering the production of coal. Reports for October showed that 192 deaths occurred in the coal mines of the United States. Included in this number were 41 deaths caused by accidents in the anthracite mines of Pennsylvania; the remaining 151 deaths were in the bituminous coal mines of various states. During the month 51,235,000 tons of bituminous and 8,332,000 tons of anthracite coal were mined. In October of last year 150 deaths occurred in the mining of 51,176,000 tons of bituminous coal and 42 deaths in the mining of 8,400,000 tons of anthracite.

Reports for the first ten months of 1929 show that accidents at all coal mines in the United States resulted in the loss of 1,729 lives. The production of coal during this period was 496,421,000 tons, showing a death rate of 3.48 per million tons of coal produced as against 3.88 for the same period of 1928, based on 1,831 deaths and 471,786,000 tons of coal mined. The record for bituminous coal alone for the 1929 period was 3.10, with 1,343 fatalities and 433,481,000 tons; while that for anthracite was 6.13, with 386 deaths and 62,940,000 tons. The same period of 1928 showed 1,456 deaths, 409,874,000 tons and a resulting death rate of 3.55 for bituminous mines, and 375 deaths, 61,912,000 tons and a rate of 6.06 for anthracite. For both bituminous and anthracite mines 1,831 fatalities were reported, with a production of 471,786,000 tons and a fatality rate of 3.88.

Comparative fatality rates for 1929 and 1928 are as follows:

	1928	Jan.-Oct., 1928	Jan.-Oct., 1929
All causes	3.777	3.881	3.483
Falls of roof and coal	1.854	1.857	1.895
Haulage	.626	.613	.653
Gas or dust explosions:			
Local explosions	.087	.091	.085
Major explosions	.566	.666	.155
Explosives	.128	.127	.149
Electricity	.153	.167	.141
Other causes	.363	.360	.405

Electricity Chief Cause Of Mine Explosions

Electricity was the chief cause of coal-mine explosions in the fiscal year ending June 30, 1929, causing 18 ignitions with 93 deaths, according to a study made by D. Harrington, chief engineer, and C. W. Owings, associate engineer, safety division, U. S. Bureau of Mines. Besides the above, open lights or smoking caused 11 ignitions with 14 fatalities; explosives 8, with 14 deaths, and 1, with a loss of 6 lives, resulted from either open lights or an electric arc. In the 38 disasters during the year, 139 lives were lost, as compared to 342 in the preceding year.

Study of the 38 explosions indicated that rock-dusting played an important part in limiting some of them. In 7 disasters, however, where only parts of the mines were treated, it is doubtful if dusting had any effect on the explosion. Closed lights were used in 19 of the mines, open lights in 18, and in one the method of lighting was unknown. At least 18 of the explosions, with 93 deaths, were caused by machinery in mines. This indicates, it is said, that mechanical appliances, in addition to causing a large number of accidents by contact, also are responsible for many explosions.

Coal Mine Fatalities During October, 1929, by Causes and States

(Compiled by Bureau of Mines and published by *Coal Age*)

State	Underground												Shaft					Surface							Total by States	
	Falls of roof (coal, rock, etc.)	Falls of face or pillar coal	Mine cars and locomotives	Explosions of gas or coal dust	Explosives	Suffocation from mine gases	Electricity	Animals	Mining Machines	Mine fires (burned suffocated, etc.)	Other causes	Total	Falling down shafts or slopes	Objects falling down shafts or slopes	Cage, skip or bucket	Other causes	Total	Mine cars and mine locomotives	Electricity	Machinery	Boiler explosions or bursting steam pipes	Railway cars and locomotives	Other causes	Total	1929	1928
Alabama	4						1					5													5	3
Arkansas	2											2													2	1
Colorado	1		1									2													2	4
Georgia and North Carolina																										1
Illinois	8		3								2	13													13	8
Indiana	2											2													2	5
Iowa	3		1									4													4	2
Kansas																									0	1
Kentucky	17		4		1		2					24						2		1				3	27	15
Maryland																									0	1
Michigan																									0	0
Missouri																							1	1	1	3
Montana																									0	0
New Mexico			1									1													1	2
North Dakota																									0	0
Ohio	5											5													5	6
Oklahoma							2					2													2	2
Pennsylvania (bituminous)	12	1	4									17						1					1	1	18	32
Tennessee	3											3													3	1
Texas	1											1													1	0
Utah	3		1									4													4	2
Virginia			1									1											1	1	2	5
Washington		1	1									2													2	2
West Virginia	23	8	19				3		1			54						1						1	55	50
Wyoming			1									1											1	1	2	4
Total (bituminous)	84	10	37		1		8		1		2	143						4		1		1	2	8	151	150
Pennsylvania (anthracite)	18	2	5	2	5			1			1	34	1				1	1	1	1		1	1	6	41	42
Total, October, 1929	102	12	42	2	6		8	1	1		3	177	1				1	5	1	2		2	3	14	192	
Total, October, 1928	88	14	46	7	2	2	10		2	1	8	180	1		1		2	4		1		2	3	10		192

Among the Manufacturers

EDWARD H. GIBBES has been appointed Eastern sales manager of the Mancha Storage Battery Locomotive Co., St. Louis, Mo., with headquarters in New York City.

* * *

MACDONALD BROS. ENGINEERING LABORATORIES, INC., OF MASSACHUSETTS, will establish at Detroit, Mich., a "merchandise mart," a national laboratory for the display and practical demonstration of industrial machinery under actual working conditions, to be known as MacDonald Bros. Engineering Laboratories.

* * *

THE FATE-ROOT-HEATH CO. (Plymouth Locomotive Works), Plymouth, Ohio, has completed a new factory unit which will double production of Plymouth gasoline and Diesel locomotives.

* * *

THE GENERAL REFRACTORIES CO., Philadelphia, Pa., has appointed the Harris Pump & Supply Co., Pittsburgh, Pa., as its high-temperature cement dealer representative in the Pittsburgh area. THE PAXSON TAGGART CO., Philadelphia, Pa., also has been made agent for the product in the Philadelphia territory.

* * *

ARTHUR C. ALLSHUL, formerly manager of the Buffalo plant, Joseph T. Ryerson & Son, Inc., has been appointed manager of the new unit in the Philadelphia district. His place at Buffalo will be taken by CLARENCE S. GEDNEY, of the specialty sales division in Chicago. The company also has purchased the business, equipment and stock of the Penn-Jersey Steel Co., Camden, N. J., to extend its service in the Philadelphia area.

* * *

THE SULLIVAN MACHINERY CO., Chicago, has completed an addition to its Michigan City, Ind., plant to take care of an increased demand for its products.

* * *

THE ALLIS-CHALMERS MFG. CO., Milwaukee, Wis., has appointed the T. B. Woods Sons Co., Chambersburg, Pa., as special distributor of Texrope drives.

* * *

THE GEO. D. WHITCOMB CO., Rochelle, Ill., has completed a new factory extension for the manufacture of locomotives of all types.

THOMAS FULLER, formerly manager of the Charlotte, N. C., office of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been made manager of the Atlanta district office, vice H. A. Coles, deceased. The company also has let a contract for the erection of a new wire products building at Bloomfield, N. J.

* * *

THE UNITED STATES ELECTRICAL TOOL CO., Cincinnati, Ohio, has appointed RALPH H. CLORE as new general sales manager, vice George M. Lawrence, resigned to go with the General Radial Drill Co., Cincinnati.

Trade Literature

Green Chain Grate Stoker (Natural Draft). Combustion Engineering Corporation, New York City. Catalog GND-2; 27 pp., illustrated. Describes the salient mechanical features.

Robins Material Handling Equipment Handbook. Robins Conveying Belt Co., New York City. Catalog No. 75; 297 pp., illustrated. Arranged in sections covering belt conveyors; bucket elevators; coal storage and reclaiming and boiler house coaling; crushers; dragline scrapers; feeders; grizzlies and screens; hoppers and gates; skip hoists; towers and bridges; transmission machinery; weigh larries; winches, wheels and haulage equipment.

Troughed Belt Gate-End Loader. Mavor & Coulson, Ltd., Glasgow, Scotland. Eight-page folder illustrating and describing the principal features of this loader.

Pneumatic Dry Cleaning of Coal. R. H. Kirkup & Co., Gateshead-on-Tyne, England. Four-page folder illustrating and describing the process and its advantages.

Davis Gas Mask—Type M-I, canister worn on breast, and Type M-O, worn on back, Bulletins 201 and 202 respectively, have recently been issued by the Bullard-Davis, Inc., New York City.

Hard-Boiled Hats and Caps is the title of Bulletin No. 801 issued by the Bullard-Davis, Inc., New York City.

Davis Permissible Single-Shot Blasting Unit, Miner's Individual Shot-Firing Battery and Burgess Batteries are described in Bulletin No. 90, and the Paulin Altimeter—Type A-1, Tycos Barometer and Paulin Barometer, described in Bulletin No. 52, recently issued by the Mine Safety Appliances Co., Pittsburgh, Pa. These bulletins are illustrated.

Tru-Lay Preformed Wire Rope is illustrated and its advantages described in a folder recently issued by the American Cable Co., Inc., New York City.

Perforated Metals; Hendrick Manufacturing Co., Carbondale, Pa. Sixty-page illustrated bulletin describing shaking screens, flanged lip screens, milled slot screens, buckets, mine cars, etc.

Single-Seam Box Header Boiler; Combustion Engineering Corporation, New York City. Folder illustrating and describing this boiler.

Commercial Explosives—Their Safe and Proper use; Hercules Powder Co., Wilmington, Del. Defines explosives and lists the various types and their characteristics. Directions for loading, priming and firing are included.

THE COMBUSTION ENGINEERING CORPORATION, New York City, has opened a branch sales office at 1411 Fourth Ave., Seattle, Wash., in charge of George M. Bechtel.

* * *

WAPPATT GEAR WORKS has discontinued the manufacture of its previous line of gears and will concentrate on the production of portable woodworking tools as Wappatt, Inc., Division of the Simonds Saw & Steel Co., Pittsburgh, Pa.

* * *

J. J. KELLEHER, formerly of the Tampa, Fla., office has become associated with the contractors' division, explosives department, Hercules Powder Co., Inc., with headquarters at Wilmington, Del. J. R. ST. CLAIR, of the Duluth, Minn., sales office, has joined the explosives' technical staff, with headquarters at Wilmington.

* * *

THE AMERICAN CABLE CO. has moved its Chicago office to the Chicago Daily News Building, 400 West Madison Street.

* * *

THE WAGNER ELECTRIC CORPORATION has moved its Milwaukee, Wis., sales and service station to 525-27 Broadway and its St. Louis, Mo., station to 909 Plaza Olive Building.

* * *

THE CHAIN BELT CO., Milwaukee, Wis., has established a New England district office at 950 Park Square Building, Boston, Mass., in charge of J. K. Merwin.

* * *

THE AMERICAN ASPHALT PAINT CO., Chicago, has purchased another factory with a floor space of 100,000 sq.ft. at Kankakee, Ill., where a complete line of asphaltic products will be manufactured.

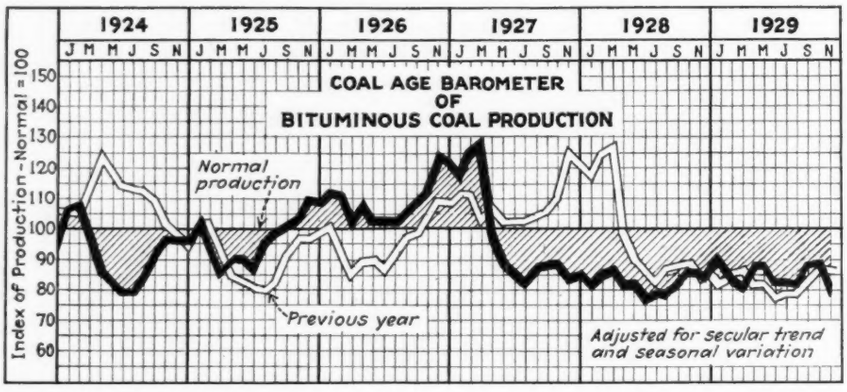
* * *

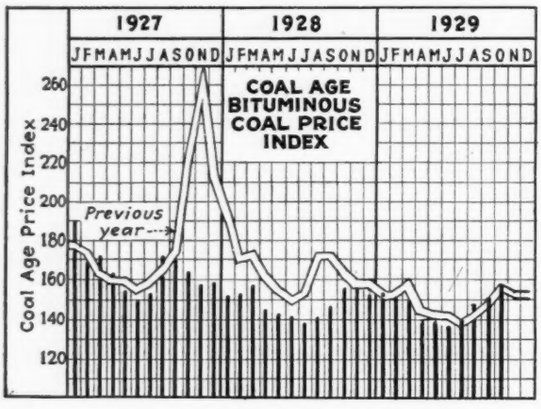
HAROLD P. TOMPKINS, Charleston, W. Va., has completed arrangements with the Truscon Steel Co., Youngstown, Ohio, for manufacturing and marketing the Tompkins extension rail.

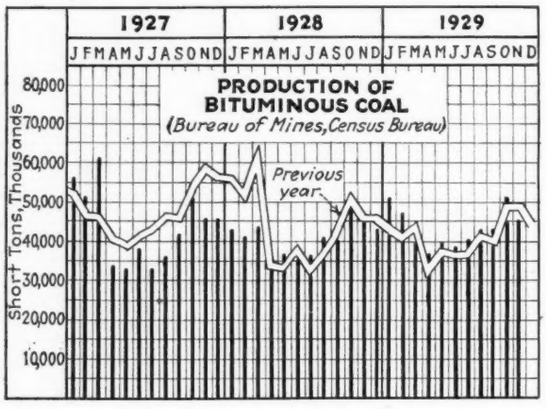
* * *

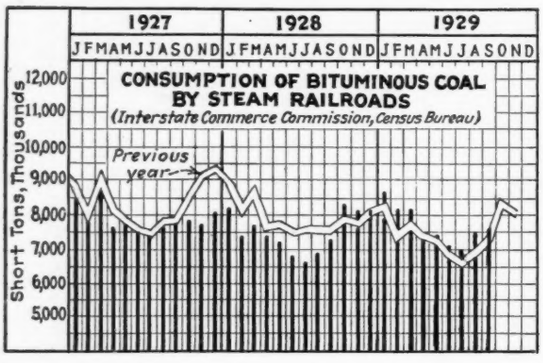
HENRY L. CROWLEY & CO. will move their offices and equipment to a new plant at West Orange, N. J., equipped for the manufacture of insulating material.

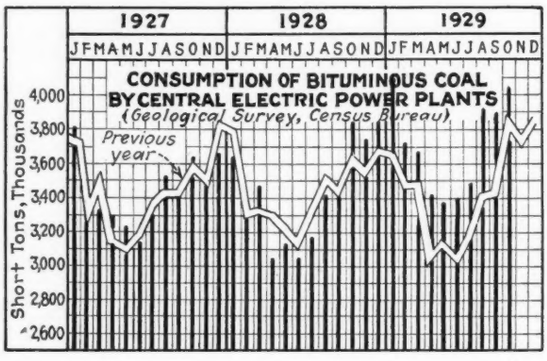
Indicators of Activities in the Coal Industry

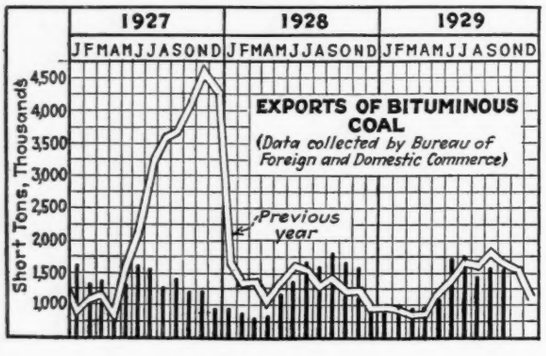


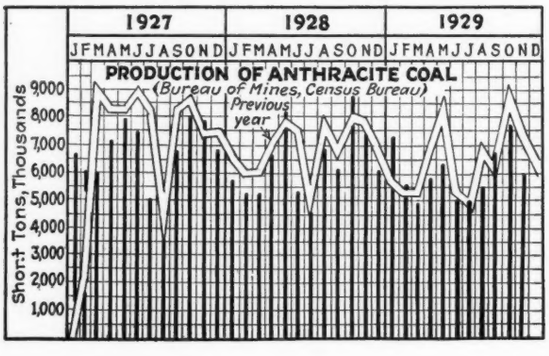












MARKETS *in Review*

COLD WEATHER in the last week of November caused a sharp increase in activity in the coal markets of the United States, as contrasted with what was otherwise an uneventful month. Domestic and, to a large extent, industrial demand sharply increased in many districts and a more definite trend toward building up stocks was evident. Prices dropped somewhat as compared to those prevailing in October, but, on the average, were higher than in the same month last year.

In Illinois, Indiana and western Kentucky, where screenings had previously been a drug on the market, curtailed production was responsible for their moving into a much stronger position. Movement to the lakes practically ceased during the month, but the effects on the market are not expected to be very marked, as the excess tonnage is being absorbed without much trouble. Danger of a car shortage seemed to have passed, as the number of surplus coal cars reported by the Car Service Division, American Railway Association, increased from 14,104 on Oct. 23 to 92,243 on Nov. 23.

November coal production is estimated by the U. S. Bureau of Mines at 45,500,000 net tons, a decrease of 5,735,000 net tons as compared to October, 1929, and of 1,288,000 net tons as compared to November of last year. *Coal Age* Index of spot bituminous prices (preliminary) was: 156, Nov. 2; 155, Nov. 9; 153, Nov. 16; 154, Nov. 23, and 155, Nov. 30. The corresponding weighted average prices were as follows: $1.89, Nov. 2; $1.88, Nov. 9; $1.85, Nov. 16; $1.86, Nov. 23, and $1.88, Nov. 30. The revised Index figures for October were: 156, Oct. 5; 157, Oct. 12; 160, Oct. 19, and 158, Oct. 26. The corresponding weighted average prices were: $1.89, Oct. 5; $1.90, Oct. 12; $1.94, Oct. 19, and $1.91, Oct. 26. The monthly Index for October was 157¾, as compared to the unrevised figure of 154⅜ for November.

Lake trade for this year has shattered all previous records. Up to Nov. 23 there had been a total of 37,172,575 tons of cargo coal and 1,427,525 tons of fuel coal dumped at the lower lake ports. Total cargo shipments for the season to Nov. 23 last year were 32,567,405 tons. In 1923, the season's total was 29,839,918 tons. In other words, the 1929 dumpings to Nov. 23 were 4,605,170 tons ahead of the same period last year and 7,332,657 tons ahead of the entire year of 1923.

ANTHRACITE enjoyed a good month on the whole, with colder weather at the last causing a jump in activity. Production, however, showed a material decrease, which is to be expected in November. Stove slumped in that month, with chestnut taking its place as the favored variety. Steam coals enjoyed a good demand, the list being headed by buckwheat.

Near zero temperatures during the last week of the month awakened people to the fact that winter had arrived, and saved the Chicago market from collapse. Before the advent of the cold spell, smokeless lump and egg were dumped at the regular contract mine-run price of $2.25. Spot cars were freely offered at $2.75@$3 as against the contract figures of $3.75@$4. Stove and nut were equally slow and weak. Mine-run, in spite of the fact that many dealers suspended shipments, held fairly well at $1.75@$2.25, with most of it moving at the higher figure. But the coming of cold weather and a sharp rise in consumption caused stocks, which had become top-heavy on all kinds of coal, to melt rapidly away and generated an active demand, in which even secondary grades from Illinois, Indiana and western Kentucky shared, especially in local territories.

Smokeless operators started to reject new business on Dec. 2, though no changes were made in the contract prices for December as compared to November, with the exception of mine-run, which advanced to $2@$2.25. Eastern high-volatiles reacted in the same manner as the smokeless varieties, both in demand and price. Prices quickly strengthened and held firm, with premium block at $3@$3.75 and ordinary grades at $2.25@$2.75. Both smokeless and high-volatile slack were scarce and tight. Byproduct varieties sold at $1.25@$1.35, best high-volatile $1@$1.10 and second grades, 80c. up.

IN ILLINOIS, Indiana and western Kentucky, uncomfortable accumulations of "no bills" were wiped out. Better quality coals from the southern Illinois and Indiana No. 4 fields were oversold three or four days and the operators were in an excellent position at the end of the month as far as screenings were concerned. Western Kentucky screenings rose from the extreme lows of October to 45c.@60c. Indiana No. 5 quotations were 85c., and central Illinois 80c.@90c. in Chicago and $1@$1.25 in the country. Southern Illinois varieties to packers in Chicago were boosted to $1.20 and were sold to other consumers at $1.50@$1.60.

The St. Louis market on the whole was poor, though a drop in the mercury and snowfalls at the last resulted in a

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		Week Ended						
		Nov. 2, 1929		Nov. 9, 1929	Nov. 16, 1929	Nov. 23, 1929	Nov. 30, 1929	
	Market Quoted	Independent	Company	Independent	Independent	Independent	Independent	Company
Broken	New York		$8.20@$8.50					$8.20@$8.50
Broken	Philadelphia	$8.40@$8.50	8.40	$8.40@$8.50	$8.40@$8.50	$8.40@$8.50	$8.40@$8.50	8.40
Egg	New York	8.60@ 8.70	8.70	8.55@ 8.70	8.55@ 8.70	8.45@ 8.70	8.45@ 8.70	8.70
Egg	Philadelphia	8.60@ 8.85	8.60	8.60@ 8.85	8.60@ 8.85	8.60@ 8.85	8.60@ 8.85	8.60
Egg	Chicago*	7.77	7.77	7.77	7.77	7.77	7.77	7.77
Stove	New York	9.15@ 9.20	9.20	9.15@ 9.20	9.15@ 9.20	9.15@ 9.20	9.00@ 9.20	9.20
Stove	Philadelphia	9.10@ 9.35	9.10	9.10@ 9.35	9.10@ 9.35	9.10@ 9.35	9.10@ 9.35	9.10
Stove	Chicago*	8.22	8.22	8.22	8.22	8.22	8.22	8.22
Chestnut	New York	8.65@ 8.70	8.70	8.65@ 8.70	8.60@ 8.70	8.60@ 8.70	8.60@ 8.70	8.70
Chestnut	Philadelphia	8.60@ 8.85	8.60	8.60@ 8.85	8.60@ 8.85	8.60@ 8.85	8.60@ 8.85	8.60
Chestnut	Chicago*	7.77	7.77	7.77	7.77	7.77	7.77	7.77
Pea	New York	4.80@ 5.00	5.00	4.75@ 5.00	4.75@ 5.00	4.65@ 5.00	4.75@ 5.00	5.00
Pea	Philadelphia	4.90@ 5.15	4.90	4.90@ 5.15	4.90@ 5.15	4.90@ 5.15	4.90@ 5.15	4.90
Pea	Chicago*	4.46	4.46	4.46	4.46	4.46	4.46	4.46
Buckwheat	New York	2.75@ 3.00	†3.00	2.75@ 3.00	2.75@ 3.00	2.75@ 3.00	2.75@ 3.00	†3.00
Buckwheat	Philadelphia	2.75@ 3.00	2.75	2.75@ 3.00	2.75@ 3.00	2.75@ 3.00	2.75@ 3.00	2.75
Rice	New York	1.75@ 2.00	2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	2.00
Rice	Philadelphia	2.00@ 2.25	2.00	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00
Barley	New York	1.35@ 1.50	1.50	1.35@ 1.50	1.40@ 1.50	1.40@ 1.50	1.40@ 1.50	1.50
Barley	Philadelphia	1.50@ 1.60	1.50	1.50@ 1.60	1.50@ 1.60	1.50@ 1.60	1.50@ 1.60	1.50

*Net tons, f.o.b. mines. †Domestic buckwheat, $3.50 (D. L. & W.)

record-breaking movement to the territory. Steam demand lagged and probably will continue to do so, as natural gas has entered the district and replaced steam sizes in several industrial plants. Prices therefore failed to show any change as compared with October. Prospects for domestic sales in December are fairly favorable though business generally is below par.

DOCK operators at the Head of the Lakes experienced a busy November, and shipments, stimulated by low temperatures all over the Northwest, were the heaviest for the same period for several years. Retailers and many industrial consumers found themselves short of stocks and came into the market in search of rush orders. Shipments from the docks are expected to substantially exceed the October figure of 26,067 cars as well as last year's tally of 37,942. The aggregate for the first ten months of 1929 stands at 205,779 cars, as compared to 196,650 for the corresponding period of last year. Receipts from Lake Erie ports in November were 975,420 tons, bringing the yearly total up to 9,810,401. Bituminous receipts in October were 968,754 tons; anthracite, 396,370 tons, and coke, 64,590 tons. Bituminous coal to Nov. 1 showed an increase of 554,019 tons as compared with the same period in 1928. Anthracite, on the other hand, declined 194,038 tons, chiefly because of the substitution of smokeless coals, coke and briquets, all of lower price.

Steam coal demand picked up slightly during the month. The market was firm in anthracite and bituminous coals. Quotations on the former were as follows: egg and nut, $12.65; stove, $13.30; pea, $9.45, and buckwheat, $7.45. Bituminous prices on the docks as of Nov. 30 were: Pocahontas lump, egg and nut, $7.90@$8; stove, $7.75; mine-run, $5; screenings, $4.10; Kentucky block and lump, $6.65@$7.25; stove and egg, $5.90; stove and dock-run, $6.05; stove, $5.80; dock-run, $5.50; screenings, $4.10; splint block, $5.65; egg, $5.35; lump and egg, $5.85; dock-run, $4.75; Youghiogheny block, lump and egg, $6.75; stove, $5.40; dock-run, $4.50; screenings, $3.85; Hocking block, $5.60; lump and egg, $5.25; stove, $5.10; dock-run, $4.50; screenings, $3.85.

MODERATE numbers of "no bills" accumulated at the Southwestern mines in November, but wholesale demand was fairly good, running well ahead a year ago. The Kansas City retail trade felt the effects of oil and gas competition in heating, but country offers were good. Arkansas coals, especially the harder varieties, moved to the North in train-load lots, some of the mines reporting an excellent business. Prices were firm on prepared sizes, though screenings eased toward the close, with Kansas varieties selling as low as $1.25.

Demand for domestic coals in the Colorado market continued to increase in November and mine running time was extended to 85 per cent. Operators during the month booked quite a number of orders ahead. Prevailing prices were as follows: Walsenburg-Canon City lump, $5.25; nut, $4.30; Trinidad coking lump, $3.50; nut, $3.35; fancy chestnut, $3.25; northern lignite lump, $3; Crested Butte anthracite egg, $8.25 brooder mixture, $4.75; Rock Springs, Wyo., lump, $4.25; nut, $3.75; Wyoming and Colorado steam sizes, $1.40@$1.65.

Cold weather shortly after the middle of November resulted in a stimulation of the former weak demand in the Louisville market and caused a slight increase in prices on the large prepared sizes. In the meantime, the cessation of lake business curtailed the mine running time and materially strengthened the price of screenings. Western Kentucky varieties rose from 15c. to 45c.@75c., and in eastern Kentucky the cheapest sold for 60c.@65c., with fancy grades as high as $1.25.

Quotations on other eastern Kentucky sizes were as follows: block, $2.25@$2.75, with premium varieties as high as $3.50; lump, $1.85@$2.25; egg and nut, $1.50@$1.85, and mine-run, $1.30@$1.65. Western Kentucky block was quoted at $2@$2.25; lump, $1.85@$2; egg, $1.75@$2; nut, $1.25@$1.50, and mine-run, 90c.@$1.30.

ZERO weather in November came to the rescue of the Cincinnati market, which had been limping distressfully because of warm spells and the cessation of lake movement. However, as far as bituminous people were concerned, production was closely watched and except for oversupplies at one or two points, the month did not turn out so bad. At the first of the month, after some few bookings outside of contracts at $4 for smokeless lump and egg, new business was practically cleaned up and price cutting followed. Some distress coal sold as low as $3 and prices on other sizes dropped 25c.@50c. a ton. Standard shippers, however, refused to permit reductions and issued December circulars at an advance of 25c. over the spot quotations.

High-volatile shippers, especially on the L.&N. in Kentucky, curtailed operations sharply and, as a result the price decline was less than that of low-volatile coals for the first time in some years. This practice also resulted in better prices for screenings, which advanced to 30c.@40c. The colder weather at the last of the month increased the retail volume tremendously, but prices did not rise. Quotations were as follows: bituminous lump, $6@$6.25; slack, $4@$4.25; smokeless lump, $8@$8.25; mine-run, $6@$6.25.

After three weeks of weakness in early November, much colder weather caused a considerable increase in demand in the Columbus market. Diminution of retail stocks resulted in a steady movement of coal to the yards and rural demand gained rapidly. While there was some recession in the wholesale price of smokeless and high-volatile grades, retail prices were firmer, with smokeless lump and egg selling at $8.75; stove, $7.25; premium splint lump, $7.25@$7.75; splint lump, $6.50; Hocking and Pome-

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

LOW-VOLATILE, EASTERN	Market Quoted	Week Ended Nov. 2, 1929	Nov. 9, 1929	Nov. 16, 1929	Nov. 23, 1929	Nov. 30, 1929
Smokeless lump	Columbus	$3.75@$4.25	$3.50@$4.00	$3.50@$4.00	$3.25@$3.75	$3.25@$3.75
Smokeless mine-run	Columbus	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25
Smokeless screenings	Columbus	1.35@ 1.50	1.35@ 1.55	1.35@ 1.55	1.40@ 1.60	1.40@ 1.60
Smokeless lump	Chicago	3.75@ 4.00	3.50@ 4.00	3.00@ 4.00	2.75@ 3.75	2.75@ 3.75
Smokeless mine-run	Chicago	2.00@ 2.25	1.75@ 2.25	1.75@ 2.25	2.00@ 2.25	2.00@ 2.25
Smokeless lump	Cincinnati	3.75@ 4.00	3.75@ 4.00	3.50@ 3.75	3.25@ 3.75	3.25@ 3.75
Smokeless mine-run	Cincinnati	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25
Smokeless screenings	Cincinnati	1.25@ 1.50	1.40@ 1.50	1.40@ 1.60	1.40@ 1.50	1.50
*Smokeless mine-run	Boston	4.75@ 4.85	4.70@ 4.80	4.50@ 4.60	4.50@ 4.65	4.75@ 4.80
Clearfield mine-run	Boston	1.70@ 1.85	1.70@ 1.85	1.65@ 1.80	1.60@ 1.75	1.60@ 1.75
Cambria mine-run	Boston	1.85@ 2.10	1.85@ 2.00	1.75@ 2.00	1.75@ 2.00	1.70@ 2.00
Somerset mine-run	Boston	1.80@ 2.00	1.80@ 1.95	1.70@ 1.90	1.70@ 1.90	1.65@ 1.85
Pool 1 (Navy Standard)	New York	2.15@ 2.50	2.15@ 2.50	2.25@ 2.50	2.25@ 2.50	2.25@ 2.50
Pool 1 (Navy Standard)	Philadelphia	2.35@ 2.60	2.35@ 2.60	2.35@ 2.60	2.35@ 2.60	2.35@ 2.60
Pool 9 (super. low vol.)	New York	1.70@ 2.15	1.70@ 2.15	1.90@ 2.15	1.80@ 2.00	1.90@ 2.20
Pool 9 (super. low vol.)	Philadelphia	1.90@ 2.15	1.90@ 2.15	1.90@ 2.15	1.90@ 2.15	1.90@ 2.15
Pool 10 (h. gr. low. vol.)	New York	1.50@ 1.75	1.50@ 1.75	1.70@ 1.95	1.65@ 1.85	1.75@ 1.85
Pool 10 (h. gr. low. vol.)	Philadelphia	1.75@ 1.95	1.75@ 1.95	1.75@ 1.95	1.75@ 1.95	1.75@ 1.95
Pool 11 (low vol.)	New York	1.35@ 1.50	1.35@ 1.50	1.60@ 1.80	1.40@ 1.60	1.60@ 1.75
Pool 11 (low. vol.)	Philadelphia	1.55@ 1.75	1.55@ 1.75	1.55@ 1.75	1.55@ 1.75	1.55@ 1.75
HIGH-VOLATILE, EASTERN						
Pool 54-64 (gas and st.)	New York	$1.20@$1.35	$1.20@$1.35	$1.20@$1.35	$1.20@$1.35	$1.15@$1.30
Pool 54-64 (gas and st.)	Philadelphia	1.15@ 1.35	1.15@ 1.35	1.15@ 1.35	1.15@ 1.35	1.15@ 1.35
Pittsburgh sc'd gas	Pittsburgh	1.90@ 2.15	1.90@ 2.10	1.90@ 2.10	1.90@ 2.10	1.90@ 2.10
Pittsburgh gas mine-run	Pittsburgh	1.70@ 1.80	1.65@ 1.80	1.65@ 1.80	1.65@ 1.80	1.65@ 1.75
Pittsburgh mine-run	Pittsburgh	1.50@ 1.80	1.50@ 1.80	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75
Pittsburgh slack	Pittsburgh	1.00@ 1.15	1.00@ 1.15	1.00@ 1.20	1.00@ 1.20	1.00@ 1.20
Kanawha lump	Columbus	2.00@ 2.50	2.00@ 2.40	2.00@ 2.40	2.00@ 2.40	2.00@ 2.40
Kanawha mine-run	Columbus	1.30@ 1.60	1.30@ 1.60	1.30@ 1.65	1.30@ 1.65	1.30@ 1.60
Kanawha screenings	Columbus	.75@ 1.00	.75@ 1.00	.75@ 1.10	.75@ 1.00	.75@ 1.10
W. Va. lump	Cincinnati	1.85@ 2.75	1.85@ 2.75	1.85@ 2.75	1.75@ 2.75	1.85@ 2.75
W. Va. gas mine-run	Cincinnati	1.40@ 1.60	1.40@ 1.65	1.40@ 1.60	1.45@ 1.60	1.40@ 1.60
W. Va. steam mine-run	Cincinnati	1.15@ 1.35	1.15@ 1.35	1.15@ 1.35	1.15@ 1.35	1.15@ 1.35
W. Va. screenings	Cincinnati	.60@ 1.10	.75@ 1.10	.75@ 1.10	.90@ 1.15	.90@ 1.10
Hocking lump	Columbus	1.90@ 2.25	1.90@ 2.25	1.90@ 2.25	1.85@ 2.25	1.85@ 2.25
Hocking mine-run	Columbus	1.35@ 1.65	1.35@ 1.65	1.35@ 1.65	1.35@ 1.65	1.35@ 1.65
Hocking screenings	Columbus	1.00@ 1.25	.90@ 1.15	.90@ 1.10	.80@ 1.00	.80@ 1.00

*Gross tons, f.o.b. vessel, Hampton Roads.

roy lump, $5.75, subject to the usual discount of 50c. per ton.

The steam trade showed some signs of improvement, with buying for both current needs and stocking reported. Since the large users have only comparatively small stocks, increased buying is expected as insurance against stoppage in cold weather. Contracting also attracted some attention in view of the imminent expiration of many fuel contracts, while screenings showed unusual strength. With the lake trade about over, little market disturbance is expected, as it is believed that the general trade will largely absorb the extra tonnage available.

GOOD stocks in the hands of retail dealers in the first part of November caused the Pittsburgh domestic business to decline until colder weather at the end of the month supplied a little stimulation. Prices receded from the season's peak of $2.50@$2.75 to $2.25@$2.50. Industrial demand, on the other hand, fell off steadily all through the month in sympathy with a decrease in business activity. Prices on domestic lump are expected to increase if the present cold weather continues. Slack, because of the decline in demand for industrial lump, was more in demand at the end of the month, and steam grades sold at 80c.@$1.

After a slow start at the beginning of November, the central Pennsylvania market picked up slightly, and the month as a whole was satisfactory. Prices remained fairly firm throughout, prevailing quotations at the last running as follows: Pool 1, $2.25@$2.60; Pools 9 and 71, $1.90@$2.10; Pool 10, $1.80@$1.95, and Pool 11, $1.60@$1.80.

New England steam demand was almost non-existent during the month of November, due to increased production as a result of higher prices a month ago. Quotations on No. 1 Navy Standard mine-run dropped from $4.75 to $4.50, f.o.b. Virginia terminals until accumulations were cleaned up. All in all, the market seemed to be in good shape, considering that there was no apparent spot buying and that the larger consumers were taking coal only on contracts at prices prevailing last spring. On cars at Boston for inland delivery, smokeless mine-run brought $5.75@$5.85; at Providence prices were 10c.@15c. less. Nut and slack were firm at $5.40@$5.50, and mixed mine-run, nut and slack brought $5.60. Nut and slack commanded $4.35 at Hampton Roads, but any increase in supply is expected to drive the price down to $4.15@$4.25. All-rail coal from central Pennsylvania had a hard job competing with the West Virginia product and recent increases of 5c.@10c. on specialties were discontinued.

LITTLE or no change over the preceding month was discernible in the Birmingham market in November. Commercial coal sold only to meet immediate needs and at the lower quotations. Prices were as follows: Cahaba mine-run, $1.75@$2; 1-in. washed, $1.35@$1.50; 3-in. washed, $1.75@$2; Black Creek washed, $2@$2.25; Big Seam mine-run, $1.25@$1.50; washed, $1.50@$1.75; Carbon Hill mine-run and washed, $1.50@$1.75; Corona mine-run, $1.90, and washed, $2.15. Domestic coal was bought very sparingly, and consequently retailers have showed no inclination to increase stocks. Further activity is contingent upon the coming of cold weather. Domestic prices were as follows: Big Seam lump and egg, $2.25; nut, $2; Carbon Hill lump and egg, $2.75; nut, $2.25@$2.50; Cahaba lump, $4.25@$5; egg, $4@$4.75; nut, $3.25@$3.50; Black Creek lump, $4.75; egg, $4.50; nut, $3.50; Montevallo lump, $5@$5.75; egg, $4.75@$5.75; nut, $3.25@$3.50; Corona lump, $3.25; egg, $3.10; nut, $2.75.

Conditions in the New York market were fair in the month of November. High-grade coals were well in demand and carried the cheaper grades along as a result. Producers of the better varieties claimed to be sold well ahead and would accept orders only for delayed delivery. Stocking on the part of consumers was still in arrears, and rush orders were occasionally necessary to keep industrial plants running. The tidewater market was inactive.

Trading in the Philadelphia market slowed down in the month of November, though the demand was still fairly active, especially for high-grade coals. Buying for storage continued at a fair rate, though stocks still were considerably lower than last year, largely because of the stand-off attitude of the railroads. Cessation of lake shipments is not expected to affect conditions except that slack will be somewhat scarcer. Bunkering activities continued at an even pace throughout the month.

NOVEMBER proved to be a good month for the New York anthracite market, with a measurable increase in demand toward the last, together with some curtailment in production as a result of holidays. The month closed with considerable increase in orders due to the prevailing low temperatures. Stove slumped in demand, its place being taken by chestnut. Pea coal moved into a better position and steam coals were in good demand, with buckwheat leading.

Mild temperatures hampered trading in the Philadelphia anthracite market until the last four days of the month, when the mercury experienced a sharp drop. This, however, failed to greatly stimulate retail buying, as consumers had good supplies in their cellars. Household buying is not expected to feel the effects until some time in December. Stove demand greatly decreased during the month, while nut moved into a stronger position. Pea was sluggish and egg continued quiet. Steam sizes, particularly buckwheat, were easier, though rice and barley sold with some difficulty. Prices remained firm.

Exports of bituminous and anthracite coal from the United States in October were 1,596,301 and 396,168 gross tons, respectively, as compared to 1,497,234 and 404,897 gross tons last year.

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

		Week Ended				
MIDDLE WEST	Market Quoted	Nov. 2, 1929	Nov. 9, 1929	Nov. 16, 1929	Nov. 23, 1929	Nov. 30, 1929
Franklin, Ill. lump	Chicago	$3.15	$3.15	$3.15	$3.15	$3.15
Franklin, Ill. mine-run	Chicago	2.25	2.25	2.25	2.25	2.25
Franklin, Ill. screenings	Chicago	1.00@ 1.60	1.00@ 1.60	1.00@ 1.60	1.00@ 1.60	1.20@ 1.60
Central, Ill. lump	Chicago	2.40@ 2.65	2.40@ 2.65	2.40@ 2.65	2.40@ 2.65	2.40@ 2.65
Central, Ill. mine-run	Chicago	1.70@ 1.85	1.70@ 1.85	1.70@ 1.85	1.70@ 1.85	1.70@ 1.85
Central, Ill. screenings	Chicago	.35@ .85	.35@ .80	.35@ 1.00	.50@ 1.00	.75@ 1.00
Ind. 4th Vein lump	Chicago	2.50@ 2.75	2.50@ 2.75	2.50@ 2.75	2.50@ 2.75	2.50@ 2.75
Ind. 4th Vein mine-run	Chicago	1.50@ 2.10	1.50@ 2.10	1.50@ 2.10	1.50@ 2.10	1.50@ 2.10
Ind. 4th Vein screenings	Chicago	1.10@ 1.40	1.10@ 1.40	1.10@ 1.40	1.10@ 1.40	1.40@ 1.50
Ind. 5th Vein lump	Chicago	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25
Ind. 5th Vein mine-run	Chicago	1.25@ 1.75	1.25@ 1.75	1.25@ 1.75	1.25@ 1.75	1.25@ 1.75
Ind. 5th Vein screenings	Chicago	.30@ .75	.30@ .75	.40@ .75	.50@ .90	.80@ 1.00
Mount Olive lump	St. Louis	2.50	2.50	2.50	2.50	2.50
Mount Olive mine-run	St. Louis	1.75	1.75	1.75	1.75	1.75
Mount Olive screenings	St. Louis	.55@ 1.00	.65@ 1.00	.75@ 1.00	.75@ 1.00	.75@ 1.00
Standard lump	St. Louis	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25
Standard mine-run	St. Louis	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75
Standard screenings	St. Louis	.25@ .60	.25@ .60	.25@ .60	.35@ .50	.45@ .60
West Ky. block	Louisville	2.00@ 2.25	2.00@ 2.25	1.75@ 2.25	1.75@ 2.25	2.00@ 2.25
West Ky. mine-run	Louisville	.90@ 1.30	.90@ 1.30	.90@ 1.30	.90@ 1.30	.90@ 1.30
West Ky. screenings	Louisville	.20@ .30	.20@ .30	.25@ .40	.35@ .60	.45@ .75
West Ky. block	Chicago	1.75@ 2.25	1.75@ 2.25	1.75@ 2.25	2.00@ 2.25	2.25
West Ky. mine-run	Chicago	.85@ 1.00	.85@ 1.00	.85@ 1.00	.85@ 1.00	.85@ 1.00
SOUTH AND SOUTHWEST						
Big Seam lump	Birmingham	$2.00@$2.25	$2.00@$2.25	$2.00@$2.25	$2.00@$2.25	$2.00@$2.25
Big Seam mine-run	Birmingham	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50
Big Seam (washed)	Birmingham	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75
S. E. Ky. block	Chicago	2.50@ 2.75	2.50@ 2.75	2.50@ 2.75	2.50@ 2.75	2.50@ 2.75
S. E. Ky. mine-run	Chicago	1.30@ 1.60	1.30@ 1.60	1.30@ 1.60	1.30@ 1.60	1.30@ 1.60
S. E. Ky. block	Louisville	2.50@ 2.75	2.50@ 2.75	2.25@ 2.75	2.25@ 2.75	2.25@ 2.75
S. E. Ky. mine-run	Louisville	1.35@ 1.65	1.35@ 1.65	1.30@ 1.65	1.30@ 1.65	1.30@ 1.65
S. E. Ky. screenings	Louisville	.50@ 1.00	.50@ 1.00	.50@ 1.10	.60@ 1.10	.65@ 1.25
S. E. Ky. block	Cincinnati	2.00@ 2.75	2.00@ 2.75	2.00@ 2.75	2.00@ 2.75	2.00@ 2.75
S. E. Ky. mine-run	Cincinnati	1.10@ 1.65	1.10@ 1.60	1.10@ 1.60	1.15@ 1.60	1.20@ 1.60
S. E. Ky. screenings	Cincinnati	.60@ 1.10	.75@ 1.15	.75@ 1.10	.90@ 1.15	.90@ 1.15
Kansas shaft lump	Kansas City	3.75@ 4.00	3.75@ 4.00	3.75@ 4.00	3.75@ 4.00	3.75@ 4.00
Kansas strip lump	Kansas City	3.00	3.00	3.00	3.00	3.00
Kansas mine-run	Kansas City	2.50@ 2.75	2.50@ 2.75	2.50@ 2.75	2.50@ 2.75	2.50@ 2.75
Kansas crushed mine-run	Kansas City	1.50	1.50	1.50	1.50	1.50
Kansas screenings	Kansas City	1.50	1.50	1.50	1.50	1.50

WHAT'S NEW

In Coal-Mining  *Equipment*

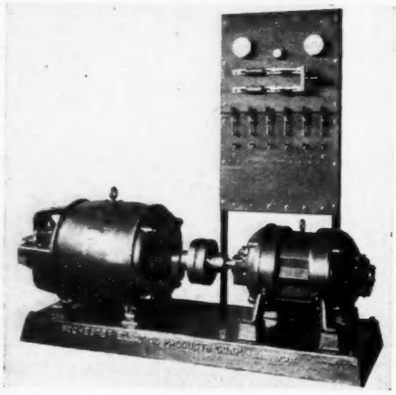
Diverter Pole Generator For Close Regulation

Asserting that the use of a storage battery probably is the most dependable source of power for the operation of circuit breakers if provision is made for keeping the battery in a properly charged condition, the Rochester Electric Products Corporation, Rochester, N. Y., says that the floating method whereby a small generator is connected and operated continuously in parallel with the battery is most desired by the battery makers.

A generator designed for such service should have five characteristics: (1) It must be stable with the very small current output that is normally required to carry the fixed load and keep the battery fully charged. (2) It must shift current demands beyond its normal capacity to the battery. (3) It must return to its original voltage promptly on return of normal conditions. (4) It should be capable of furnishing its rated current capacity at a sufficiently high voltage to permit quickly recharging the battery following prolonged power failure (and for occasional so-called overcharging). (5) It must be safe against running away or reversal of polarity in case of power interruptions.

These conditions have been met, the company asserts, in the design of its new Diverter Pole generator. The characteristic voltage curve shows only a slight drop in voltage from no load to approximately full load. After switch operation, the tendency is to recover to a slightly higher voltage, insuring that the generator comes back to its original setting and correcting any tendency of the generator voltage to vary. In an unattended substation any generator running under normal conditions (practically no load) tends, it is claimed, to put a glaze on the commutator that may reduce the voltage below the proper floating limit. Switch operation is said to aggravate this condition with the shunt machine, but is a corrective with the Diverter Pole type.

13-Kw. Diverter Pole Generator



At slightly above full load, there is a sharp drop in the characteristic voltage curve of the Diverter Pole machine, which protects both the generator and driving motor against overloads. As the generator carries the load up to its maximum capacity, the voltage during switch operation is maintained at a higher value.

The Diverter Pole generator, according to the maker, might be described as a shunt interpole machine, the main pole and interpole being one punching. By the action of the interpole on the main field, the Diverter Pole construction results in the characteristics outlined above. Experience has shown, it is claimed, that the generator polarity cannot be reversed. It also is possible to design a machine having a fairly high degree of saturation in its magnetic field when operating at 130 volts, yet capable of being operated at 170 volts.

In comparison with the shunt-wound generator, the company makes the following statements: At light loads, the voltage of the Diverter Pole generator remains constant, since any voltage loss is corrected by switch operation; with the shunt machine, the voltage tends to fall and this condition is aggravated by switch operation. At normal loads, the Diverter Pole voltage is constant while the shunt voltage varies with each change in load. When the oil switch is operated, the Diverter Pole machine furnishes current equal to its rated capacity, thus helping to maintain bus voltage; the shunt machine furnishes practically no load and the bus voltage is lower, as the battery takes it all. In case of power failure, both machines will operate safely as a motor. Operating at 130 volts but with the generator capable of going to 170 volts, the Diverter Pole voltage is stable, while that of the shunt generator usually is unstable.

Diverter Pole generators may be obtained in capacities of from 250 watts to 50 kw., inclusive, and in voltages ranging from 5 to 500. They also are useful, the company states, for charging batteries in parallel or by the floating method, for testing purposes, remote metering and other work where close regulation is important.

High Cartridge Count In New Explosive

A new permissible explosive has been placed upon the market by the Hercules Powder Co., Wilmington, Del. This explosive, Hercoal-D, is one of a series of new type explosives developed by Hercules within the past two years. The leading characteristics of Hercoal-D enumerated by the company are: Extremely high cartridge count per 100 lb.; minimum of smoke and fumes; cushioned blasting effect productive of lump coal, and all the Bureau of Mines' qualifications for a permissible. Hercoal-D, with a cartridge count of approximately 450, is designed to fill the gap between Hercoal-C with approximately 400 $1\frac{1}{4}$x8-in. cartridges per 100 lb., and Hercoal-F, with approximately 500.

Oxygen Pressure Reduced In Two Stages

The Oxweld Acetylene Co., New York City, has added to the Prest-O-Weld line a two-stage oxygen regulator, designed to eliminate fluctuation in working oxygen pressures. This regulator, which is designated as the type R-109, incorporates the stem-type valves which have proved satisfactory on single-stage regulators.

The chief feature of the improved design, according to the company, is two-stage pressure reduction, accomplished through the medium of two independent sets of diaphragms, valves and springs. Instead of reducing the full cylinder pressure of about 2,000 lb. per square inch down to working pressure in one-stage, the R-109 regulator reduces through this wide range in two stages. In the first stage the cylinder pressure is reduced through a

non-adjustable reducing valve to about 175 lb. per square inch. Leaving the first stage, the oxygen passes to a second valve and diaphragm assembly where the pressure is reduced to that desired by the operator, the second-stage reducing valve being adjustable by means of the hand wheel. Thus, instead of reducing the full cylinder pressure to working pressure, the second stage is required to regulate pressures within only a narrow range.

When the pressure in the cylinder falls below about 175 lb. per square inch, the first-stage valve remains fully open. It is thus automatically cut out of the system and the second-stage valve and diaphragm only are operative. The type R-109 regulator, the company says, will operate with equal efficiency whether the oxygen cylinder is full or nearly empty, and the working pressure will remain constant.

Trouble sometimes experienced in the past from opening cylinder valves with the adjusting screw of the oxygen-regulator turned in, thus permitting the full cylinder pressure to enter the low-pressure gage and rupture the Bourdon tube or damage the valve stem or seat, has been largely eliminated in this regulator, the maker states, since it is impossible for the full cylinder pressure to enter the low-pressure gage. The first-stage valve is of such sturdy design that it will withstand the most severe impact likely to occur. The type R-109 oxygen regulator supersedes the type R-105. It is provided with 3,000-lb. and 100-lb. gages, and is equipped with a ¼-in. ferrule hose connection.

Welding Rod *Developed*

The Haynes Stellite Co., Kokomo, Ind., has placed on the market a manganese-chrome-iron welding rod called "Hascrome." This, the company states, is a self-hardening alloy designed primarily for building up badly worn parts preparatory to surfacing them with Haynes "Stellite," which is also supplied in the form of a welding rod. Since the cost of "Hascrome" is said to be materially less than that of Haynes "Stellite," the resulting composite surface is much cheaper than if entirely built up of the latter alloy.

According to the Haynes company, "Hascrome" may be used for building up large sections of steel or cast iron, and forms an excellent base for "Stelliting," because it is sufficiently hard to resist deformation under impact and because of the ease with which Haynes "Stellite" flows onto it. Although, in some cases, "Hascrome" alone may be used for hard-surfacing parts subject to abrasive wear, it does not possess hardness to the same degree as Haynes "Stellite" and will wear away more rapidly. The new alloy is also being used, it is said, for tacking "Haystellite"—the Haynes company's diamond substitute—to the cutting and reaming edges of oil well drilling tools.

"Hascrome" may be applied with either the oxyacetylene flame or the metallic arc, though the company recommends the former. The deposit is said to have a tensile strength of 40,000 and a compressive strength of 177,000 lb. per square inch. It can be forged and ground, but not machined. "Hascrome" is available in welding rods ¼ in. in diameter and 36 in. long, packed in bundles of 50 lb. each.

Refinements Made *In Grinders*

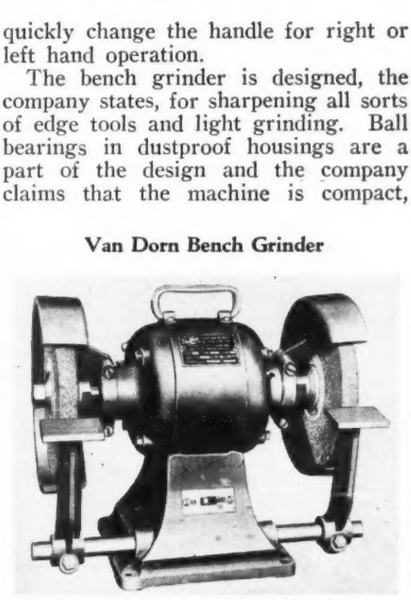
New products announced by the Van Dorn Electric Tool Co., Cleveland, Ohio, include a 7-in. "Flex-Disc" grinder and a 7-in. bench grinder. The "Flex-Disc" machine is a companion to the former 9-in. type and is recommended by the company for smoothing welded and soldered joints and seams, cleaning dies, smoothing metal surfaces before painting, or other work requiring filing, sanding or grinding. Refinements noted by the company include a removable pipe handle and right- and left-hand bosses, making it possible to

"Flex-Disc" Grinder

quickly change the handle for right or left hand operation.

The bench grinder is designed, the company states, for sharpening all sorts of edge tools and light grinding. Ball bearings in dustproof housings are a part of the design and the company claims that the machine is compact, sturdy, smooth running and vibrationless at all speeds. It is furnished complete with grinding wheels, tool rests, wheel guards and switch and cable, and may be had for all voltages and currents.

Van Dorn Bench Grinder



Self-Sealing Is *Feature Of New Bearing*

A self-sealed, self-lubricated ball bearing, said to reduce mounting costs and increase bearing efficiency and service life, has been announced by the New Departure Mfg. Co., Bristol, Conn. It is made only in the smaller sizes and consists essentially of a New Departure, single-row ball bearing of the non-loading groove type, permanently fitted into a metal case or shell. The shell is shaped on one side of the bearing to contain a felt closure which fits over the ground outside diameter of the extended bearing inner ring, thus forming, it is claimed, an efficient seal both for the retention of lubricant and the exclusion of dirt.

While the inner ring is carried slightly beyond the face of the seal to facilitate removal without damage and to prevent interference between shaft shoulder and seal, the over-all width is said to be much less than that of a standard bearing of the same size together with a separate closure member. Outside bores and diameters are standard and the company asserts that the capacity characteristics of the new N-D-Seal bearings are substantially the same as corresponding sizes of non-loading groove, single-row bearings.

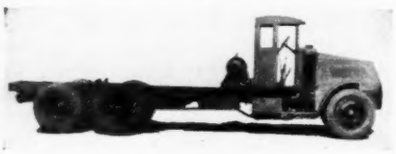
Advantages detailed by the company are as follows: eliminates necessity for making closure caps or seals; drilling and tapping of bearing housings incidental to the use of separate closure members eliminated as well as practically all the facing formerly required; reduces machining costs and speeds assembly because of simplicity and small number of parts; machine maker is saved the necessity of selection, stocking and applying of lubricant for bearings, as the correct quantity and kind is furnished with the bearing; results in quieter operation; occupies less space than bearings with separate closures; makes careful finishing of the shaft unnecessary, and materially reduces bearing maintenance, as original lubricant furnished with the bearing may be expected to last from 2 to 5 years.

High-Speed Trucks Have Six Wheels

Mack Trucks, Inc., New York City, announce that their Super-Duty line of trucks, two models of which are designed to carry great loads at high speed, is now going into production. The AP four-wheeler and the AP six-

wheeler are said to carry 7½- to 10-ton loads at 30 miles an hour and climb 20 per cent grades with ease. Powered with six-cylinder, high-compression motors, it is claimed that they will haul 35-ton drawbar loads at 25 miles per hour. It also is stated that the service element is enhanced with the high speeds possible.

In addition to the AP model, the Super-Duty line includes the AC model with new high-compression engine and six-wheel drive for hauling heavy loads at low speeds under the conditions encountered in the earth-moving industry. In the AP model the six-wheel feature with four driving wheels in the rear is said to be an innovation of great importance. The characteristic heavy-duty chain drive has been retained.



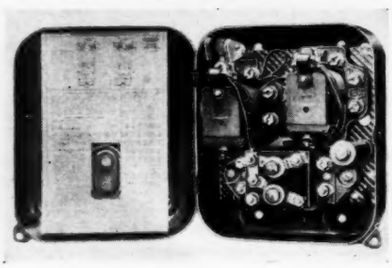
Mack Super-Duty Truck

Besides the Super-Duty line, the company has brought out the Model BC truck, a six-cylinder machine for use where diversified hauling requires power, capacity, and high, safe speed. The model BC engine develops 100 hp. at 2,400 r.p.m., with a bore and stroke of 3¾x5½ in. Features noted by the company include a combined fan and water pump, crankcase ventilation provided by a flexible tube extending from the valve cover plate to the elbow on the carburetor intake, throttle control of the exhaust heat applied to the inlet manifold through a jacket on the riser, and thermostatic temperature control. Engine lubrication is by a high-pressure system operating under a pressure of 55 lb. per square inch.

Automatic Starter Sets Overload Limit

A new, automatic, across-the-line starter for general applications on direct-current motors up to 2 hp., 115 or 230 volts, is offered by Cutler-Hammer, Inc., Milwaukee, Wis. Some new and important features incorporated in this design are, according to the company: Small size, low cost, double line break, thermal overload protection, low voltage protection, silver contacts and completely inclosed structure. Two magnetic contactors, one in each side of the line, connect the motor directly across the line on starting and provide a double line break. The contactors are designed especially for direct-current service, with renewable silver contacts and a heavy stamped frame.

Cutler-Hammer 6101 D.C. Starter With Overload Relay



The thermal overload relays are the same as those used in this company's a.c., across-the-line starters for small motors. They are the fusible alloy type and can be adapted, it is stated, to any size motor by simply changing heater coils. When tripped by an overload, the relays are reset by pushing a button in the cover. Each starter is equipped with a push-button master switch providing three-wire control, and this switch can be furnished mounted in the cover of the starter or can be arranged for mounting separately. These starters are also made without the thermal overload relays for applications where overload protection is not required.

Panel for Charging Vehicle Batteries

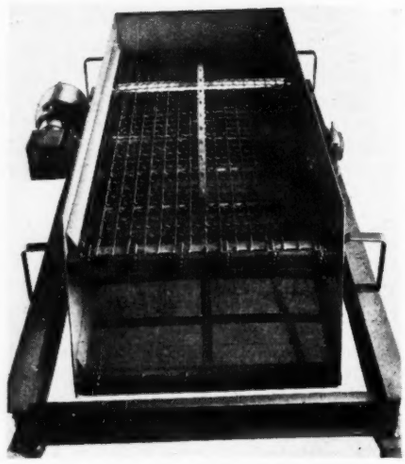
A new control panel designed for charging six vehicle batteries, each of the 42-cell, 13-plate type, is announced by the General Electric Co. The panel is for use in conjunction with a motor-generator set consisting of a 27-kw., 110-volt generator driven by a 40-hp., 550-volt 3-phase, 60-cycle motor.

In conjunction with a magnetic starter for the motor the panel provides overload protection for the generator, restarting of the set and resumption of charging after line failure and full automatic shut-down after completion of the charging of the batteries.

Gyratory Screens Built For All Materials

Large capacity, small floor space, and long life are the chief features claimed for the "Simplicity" utility gyrating screens manufactured by the Simplicity Engineering Co., Durand, Mich. The company states that they are suitable for screening sand, gravel, stone, slag, coal, ore and all screenable materials. These screens may be obtained in single-, double-, and triple-deck types with 2x6- or 3x6-ft. screen surfaces, and in single- and double-deck types with 4x8-ft. screen surface.

Uniform grading of the material being screened is said to be made certain by an eccentric arrangement with a positive motion—¼ in. lengthwise and ¼ in. up and down, or a true circular motion of ¼ in.—against the flow of material. This, it is asserted, retards the flow and allows the finer particles to go through the mesh rather than follow the larger particles over. Twice the capacity at half the cost, economy in operation, perfect balance, faster screening, perfect separation on either wet, damp or dry material without loading or blinding; ball bearings, and interchangeable backs are features pointed out by the maker.

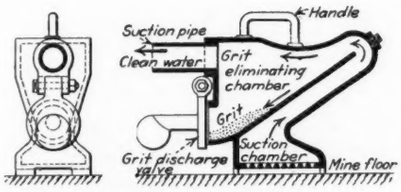


Double-Deck, Direct-Motor-Drive, 4x8 "Simplicity" Utility Screen

Winch Has No Ratchets

Hand-operated, general utility post- and wall-type safety winches and a new grit-catching strainer for mine pumps have been brought out by the Modern Engineering Co., Pittsburgh, Pa. Both the post- and wall-type safety winches are made for a capacity of 400 or 1,000 lb. and are recommended by the maker for use in mills, mines and repair shops where small loads must be handled. The chief feature emphasized by the company is an automatic brake, operated by the pull of the load. To raise the load, the handle is turned one way; to lower it, it is turned the other way. In raising the load, the brake offers no resistance, but when power on the handle is relieved the load is locked in position, giving, according to the maker, full control and safety at all times.

The operation of the grit-catching strainer is as follows: The water is sucked up through the gooseneck into the grit-eliminating chambers. The area of the cross-section through which it travels constantly increases, thus retarding the speed of the water and causing the grit to settle in the grit chamber. Lifting the valve allows the accumulated grit to be flushed out. According to the company, this equipment



Grit-Catching Strainer

may be obtained to take either 2- or 3-in. pipe and is easily moved from place to place. Metal used in construction may be varied to suit the water at any particular mine.

Conveyor Said to Be Rugged and Mobile

The Gellatly Type "W" conveyor has been built, Gellatly & Co., Pittsburgh, Pa., state, to withstand abuse and allow easy movement. It is asserted that it is a considerable improvement over former cumbersome and awkward machines where time saved in getting the coal back from the face was lost in moving the conveyor. Details of the Type "W" conveyor, as given by the manufacturer, are shown in the accompanying table.

Specifications, Type "W" Conveyor

Intermediate section, 6 ft. 2 in. long, lb.	135
Tail section, lb.	185
Head section, lb.	380
Power unit (with 15 hp. motor), lb.	1,200
Chain 6. 2 lb. per foot or 80 lb. per 12 ft. length.	
Maximum length, ft.	300
Capacity, tons per hour	60
Width of trough, in.	17½
Height of trough, in.	11
Length of tail piece, ft.	3
Height of power unit, in.	28
Width of power unit, in.	21
Length of power unit, in.	52

In construction, the conveyor is made in 12-ft. units, each weighing 135 lb. The power unit is separate, making it easy to move, and motor specifications are optional with the purchaser. A single chain, heat-treated, is used, giving, it is claimed, a high factor of safety and long life. The flights are heavy, high-carbon forged steel. Flat plates are provided under the tail section and power unit to facilitate skidding, and the conveyor is reversible for taking timber and supplies to the face. Special discharge ends can be furnished, according to the company, and the machine can be had either with or without an elevator to operate from the main line conveyor.

Type "W" Conveyor Discharging Into Elevator

Universal Guides Feature Pipe Threader

A new pipe threader introduced by the Oster Mfg. Co., Cleveland, Ohio, is said to incorporate, among other advantages, universal guides which automatically center the pipe. The new tool, called the "Leader," threads and cuts pipe thread nipples from 1 to 2 in. in diameter. The company states that the universal pipe guides, a radically different ratchet construction, floating stud arrangement and fully adjustable dies make the tool easy to operate and fast in threading and cutting operations. Two types are available, according to the maker. The No. 1 is a plain tool without the ratchet device and the No. 1A features the ratchet construction.

Folding Bug-Dust Scraper Removes Cuttings

For taking out the dust left by cutting machines, the Martin Hardscog Co., Pittsburgh, Pa., is now marketing the Fanberg bug-dust scraper, shown in the accompanying illustration. By a downward pressure on the handle the blade folds and the rounded shape of the bottom edge allows it to be run back to the back of the cut. It then automatically assumes an upright position for pulling out. According to the company, it is much lighter than a shovel; quick and fast in operation; works where the shovel is useless; does the work with half the effort; costs less than a good shovel; cleans cut in much less time; does not lose cuttings coming out, and can be used for levelling mine cars in low rooms.

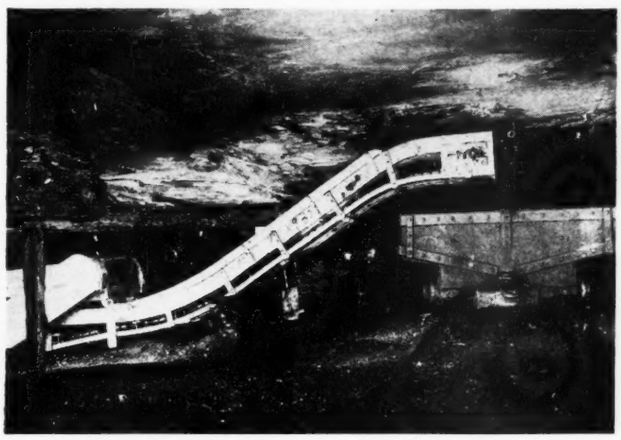
Scraper in Open and Closed Positions

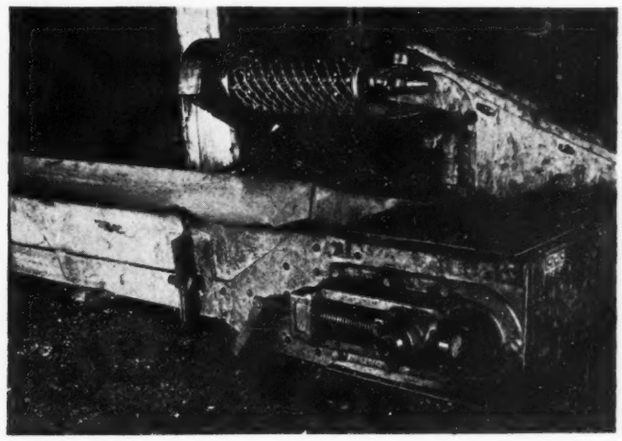
Chain Feeder for Coal And Lump Material

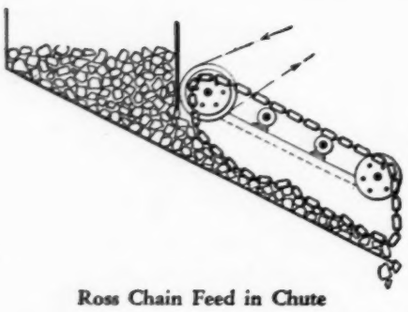
One of the difficulties in discharging coal or other lump material from bins by means of chutes is the inaccuracy in the control of the operation. To obviate this trouble the Ross feeder illustrated was developed in England and is now being introduced in this country by the Ross Screen & Feeder Co., New York City. This feeder, it is claimed, makes it possible to use a large chute opening and at the same time to control the flow of feed within close limits.

The feeder consists of a curtain of heavy, endless steel chains driven by an overhead tumbler and suspended in front of the chute opening so as to lie on the material and to travel with it for a considerable distance. The accuracy of control is said to be within 2 per cent on a tonnage basis. Several other variations of the principle have been worked

Mat Face Conveyor Discharging Into Type "W" Conveyor





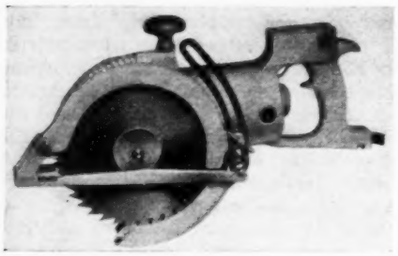


Ross Chain Feed in Chute

out wherein the feeder may be used in connection with chutes of variable angles, chutes which are equipped with grizzly bars for screening out the fines, and various other uses.

Electric Hand Saw Has Dust Blower

The Wodack Tool Corporation, Chicago, has brought out a 15-lb., one-hand, electric saw, said to have a maximum capacity of 2⅝ in. Compact construction is emphasized by the company, and auxiliary equipment includes



Model "K" Electric Hand Saw

a saw-dust blower for perfect vision, convenient trigger switch and momentary contact, easily adjusted rip gage.

Automatic Battery Switch Sets Charging Time

R. W. Cramer & Co., New York City, is now marketing the new Sauter, Type C.E.P. 44, automatic battery charging switch, which the maker states is for automatically interrupting the charging current or breaking the a.-c. feeder leading to a motor-generator set or rectifier at the termination of a predetermined charging period. Provision has been made in the design, it is asserted, for setting the operating dial for such overcharging periods as may be desired.

The assembly consists of a time clock automatically wound by a 110- or 220-volt universal motor. All the electrical contacts of the main switch are said to have been liberally designed and the entire assembly is inclosed in a pressed-steel, dustproof housing.

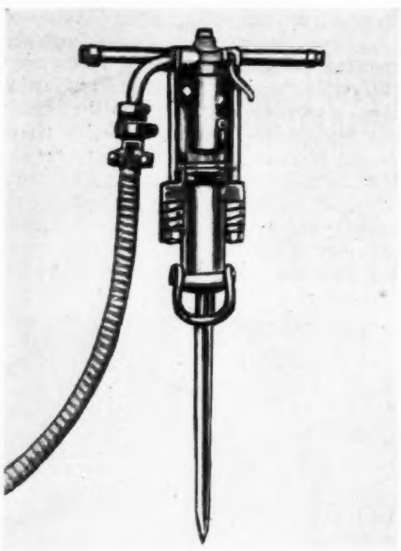
Differential Chain Hoist Has Timken Bearings

A differential chain hoist said to possess three new and exclusive features of superiority has been announced by Robbins & Myers, Inc., Springfield, Ohio. Timken thrust bearings used in the lower hook are said to permit easy turning of the load in addition to reducing chain and upper sheave-wheel wear caused by chain twisting. The sheaves are of Aremite, an alloyed iron produced in the Robbins & Myers foundry, which, it is claimed, has a tensile strength twice that of ordinary gray iron, as well as an unusual hardness and durability.

Aluminum finish is used throughout, chains excluded, for the purpose of providing protection against damage from exposure. The chains are of a special analysis steel, heat-treated and electrically welded. This hoist is manufactured in five sizes, with capacities ranging from ¼ to 2 tons.

Rock Drill Said to Be Light and Fast

The Gardner-Denver Co., Denver, Colo., is now marketing the new Model 11 rock drill, which the company states is a light, all-purpose drill for either wet or dry drilling. Its weight, according to the manufacturer, is 50 lb. and it has a drilling speed equal to that of heavier machines, giving an unusually heavy footage with a minimum



Gardner-Denver Model 11 Rock Drill

of strain on the operator. It is rotated by a rifle bar and ratchet and may be mounted for light drifting or channelling with a quarry bar, used on a tripod, or applied to miscellaneous purposes where a light mounted drill is required. It takes ⅞- to 1-in. drill steel.

In ordinary operation, it is said, the drill keeps the hole clean by sending a strong air current through the drill steel, but when drilling unusually deep holes a special blowing device may be used. Lubrication of all moving parts is accomplished by a single oil reservoir in the cylinder or Gardner-Denver air-line oilers may also be used.

Portable Paint Sprayer

The Breuer Electric Mfg. Co., Chicago, has placed on the market a new electric paint spray machine for touch-up work, shading and light finishing and refinishing jobs, as well as semi-production and maintenance industrial painting. This machine, of the Tornado portable electric type incorporating a

"Tornado" Portable Electric Paint Sprayer

rotary compressor, is built of aluminum castings and equipped with ½-hp. General Electric universal motor.

Two tips are provided, one slotted for fan spray and the other for narrow spray, covering an area of 2 to 14 in. An adjusting screw controls the quantity of paint to be used. The complete machine, equipped with quart container, two tips, 20 ft. of reinforced rubber-covered cord and 8 ft. of rubber web-covered hose, weighs 9 lb.

Circuit Breaker Protects Isolated Machines

Type FK-33 is the designation of a new oil circuit breaker announced by the General Electric Co. for manual or electric operation. These devices are rated 4,500 volts, 200 and 400 amperes, 2-, 3-, and 4-poles, single- and double-throw and have interrupting capacities of approximately 20,000 kva. at rated voltage.

The Type FK-33 oil circuit breaker is recommended for use in small plant and industrial installations and for stations where a substantial and reliable breaker of moderate interrupting capacity is required. The breakers are compact in design, have small over-all dimensions, are easy to operate and are inexpensive.